DataQuill Limited v. Apple Inc.
Doc. 1 Att. 2

Exhibit 2

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US007139591B2

(12) **United States Patent**
Callaghan et al.

(10) **Patent No.: US 7,139,591 B2**
(45) **Date of Patent: *Nov. 21, 2006**

(54) **HAND HELD TELECOMMUNICATIONS AND DATA ENTRY DEVICE**

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(73) Assignee: **Dataquill Limited**, Tortola (VG)

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

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **10/869,215**

(22) Filed: **Jun. 15, 2004**

(65) **Prior Publication Data**

US 2005/0020305 A1 Jan. 27, 2005

Related U.S. Application Data

(63) Continuation of application No. 09/548,565, filed on Apr. 13, 2000, now abandoned, which is a continuation of application No. 08/619,682, filed as application No. PCT/GB94/02101 on Sep. 27, 1994, now Pat. No. 6,058,304.

(30) **Foreign Application Priority Data**

Oct. 13, 1993 (GB) 9321133.2

(51) **Int. Cl.**
H04B 1/38 (2006.01)

(52) **U.S. Cl.** **455/557**; 455/556.1; 455/422.1; 235/462.46; 235/472.02

(58) **Field of Classification Search** 455/422.1, 455/556, 403, 406, 408; 235/462.46, 472.02, 235/375, 480; 379/93.12, 93.25, 100.02, 379/100.12

See application file for complete search history.

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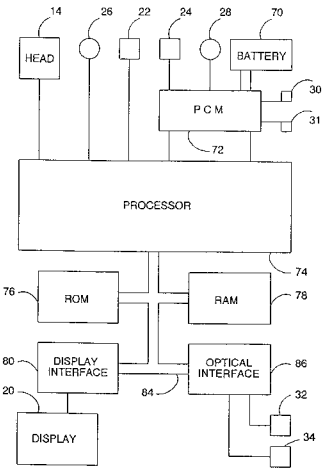
(57) **ABSTRACT**

A data entry system includes a hand held data entry unit having a reading sensor for sensing commands and/or data, rewritable storage for storing information relating to selectable items, a controller (a microprocessor or other processing circuitry) and a display screen for displaying a user readable representation of the commands and/or stored information for a selected item, and a telecommunication interface for the telephonic transmission of information relating to a selected item or items from the storage to a remote processing center and for the telephonic information relating to selectable items from the remote processing center to the storage. Preferably a telecommunications interface is provided in the hand held unit for cellular or other wireless telephony systems. The hand held unit can be configured to combine the data entry functions with those of audio telephony.

62 Claims, 11 Drawing Sheets



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Internal Memorandum Re Summary of Response to Siemens re recent references from Siemens re U.S. pat. 6,058,30, dated Apr. 27, 2006 3 pages, DataQuill outside litigation counsel, and attached claim charts of Siemens Corp., Exhibits A, B and C, 15 pages, dated Apr. 25, 2006.

The GSM System for Mobile Communications A comprehensive overview of the European Digital Cellular Systems, Cell & Sys. Correspondence, © 1992, 3 cover pages, pp. 56-59, 550-565.

Internal Memorandum Re Summary of Response re recent references from Motorola re U.S. pat. 6, 058,304, Dataquill outside litigation counsel, dated May 23, 2006, 9 pages, and attached claim charts, Exhibits A and B, dated May 4, 2006, 8 pages, attached Dataquill Meeting Ahenda and claim chart, Exhibit C, dated May 9, 2006, 16 pages.

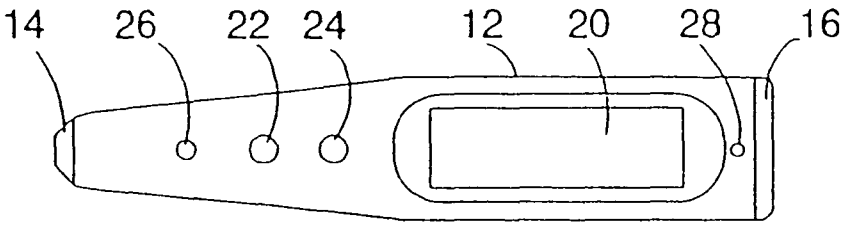


FIG. 1A

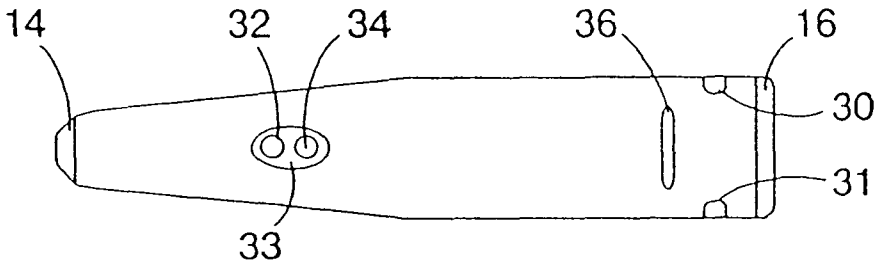


FIG. 1B

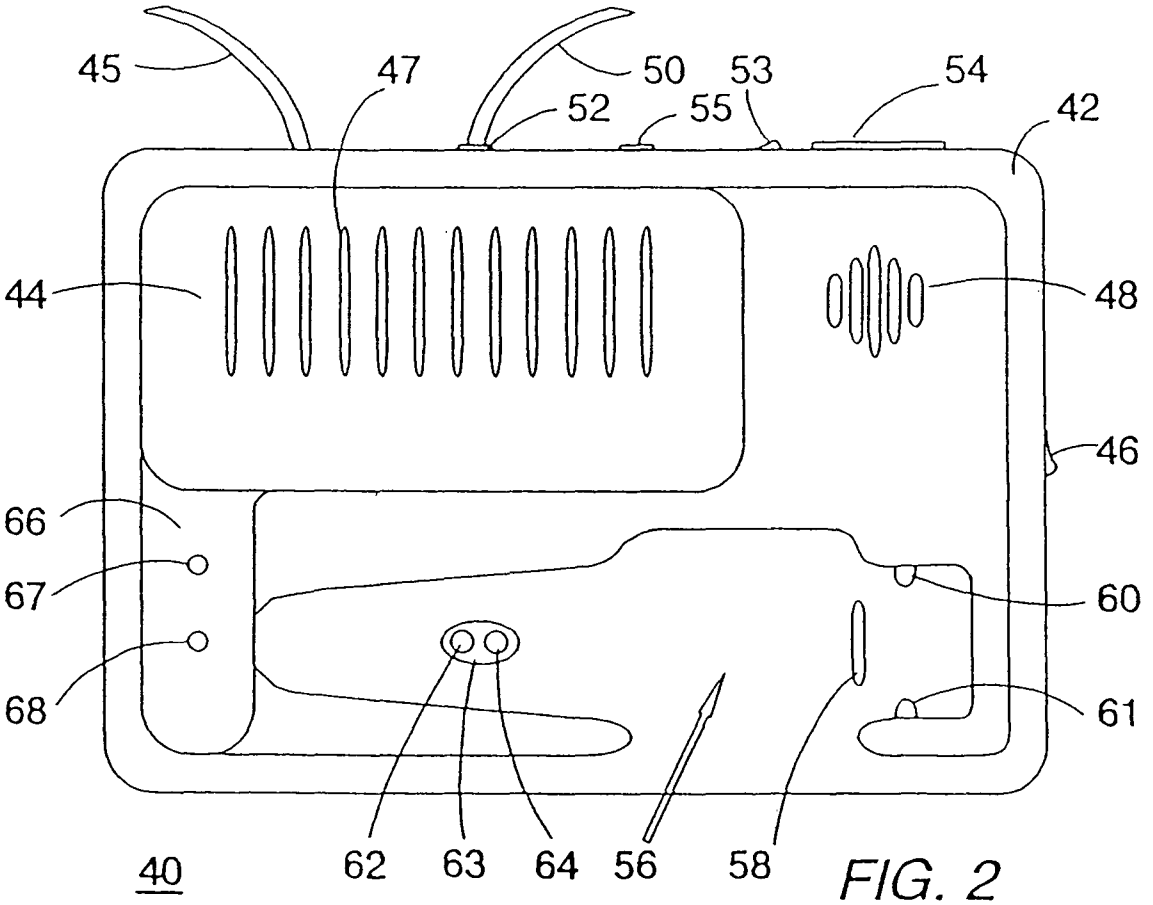


FIG. 2

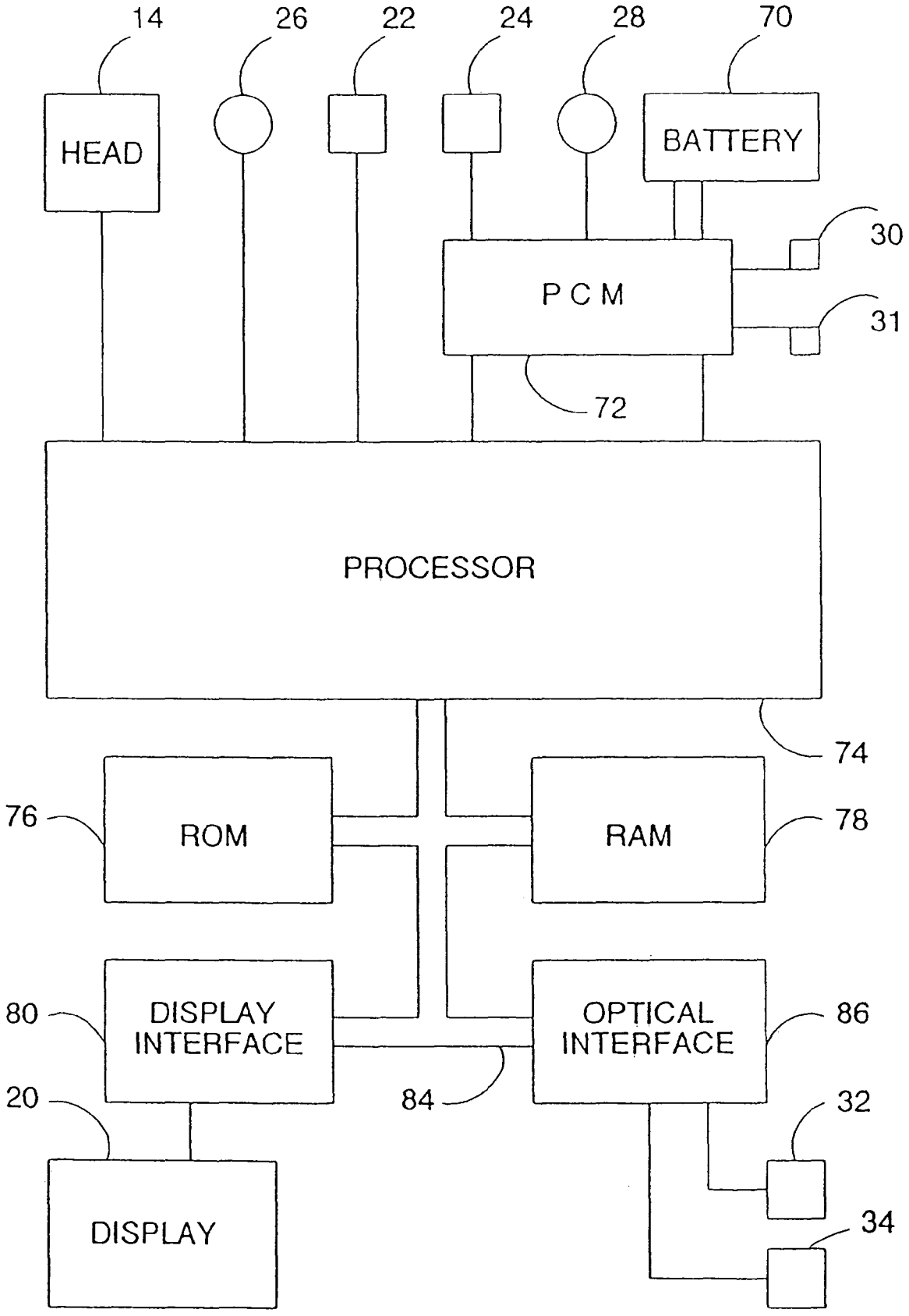

14
26
22
24
28
70
HEAD
BATTERY
30
PCM
31
72
PROCESSOR
74
76
ROM
RAM
78
80
DISPLAY INTERFACE
OPTICAL INTERFACE
86
84
20
32
DISPLAY
34

FIG. 3

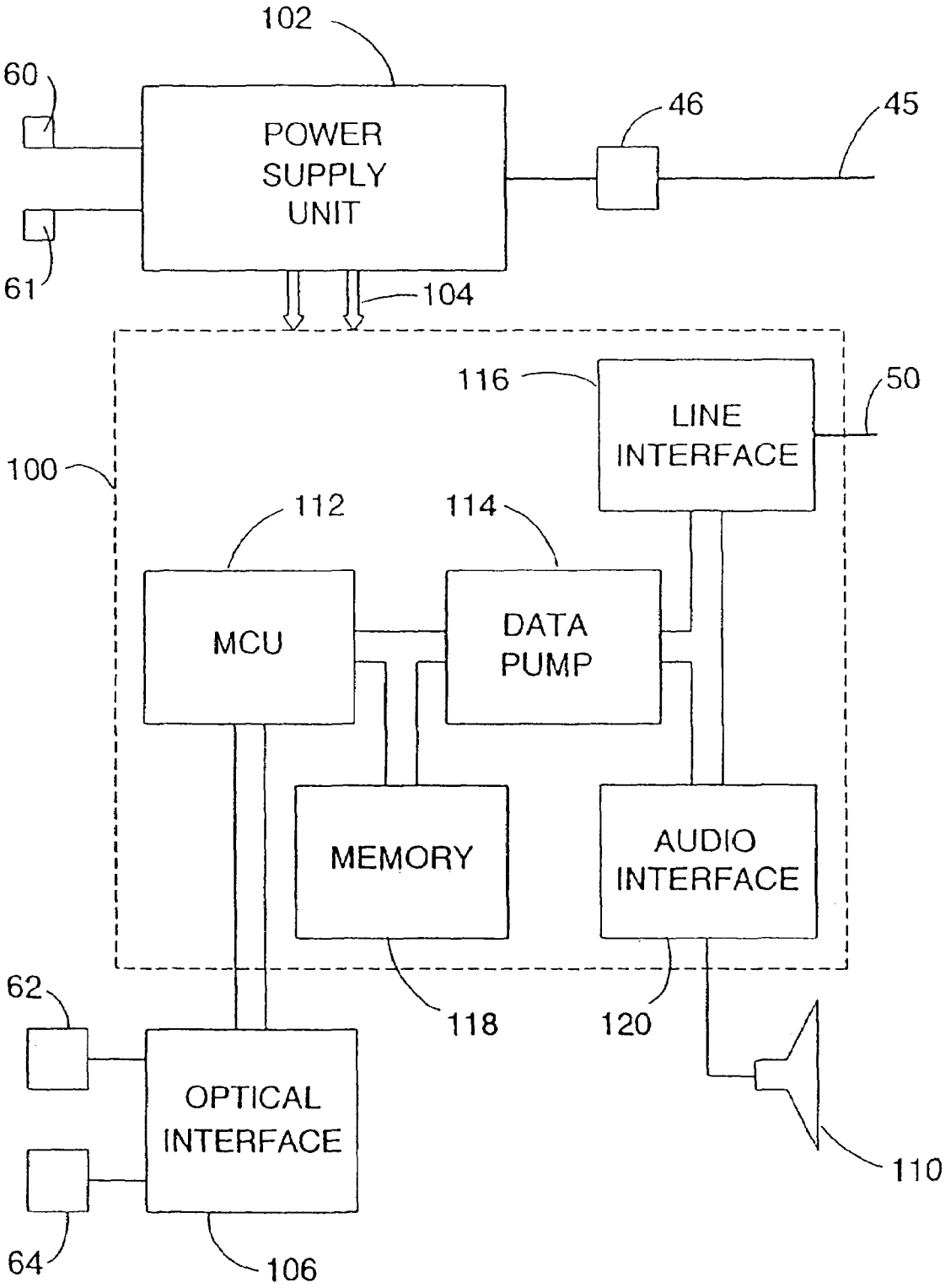

102
60
POWER SUPPLY UNIT
46
45
61
104
116
LINE INTERFACE
50
100
112
114
MCU
DATA PUMP
MEMORY
AUDIO INTERFACE
62
118
120
OPTICAL INTERFACE
110
64
106

FIG. 4

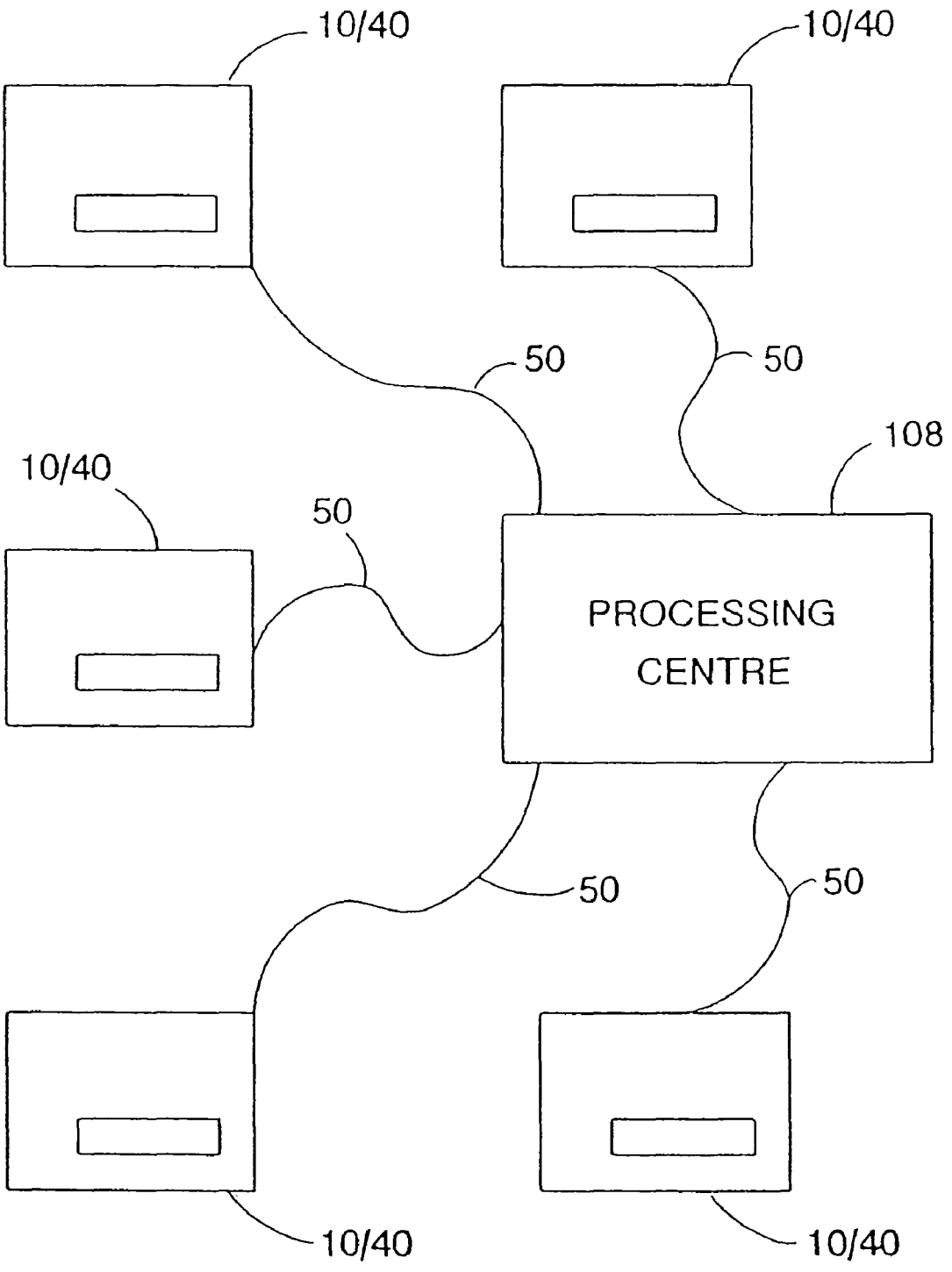
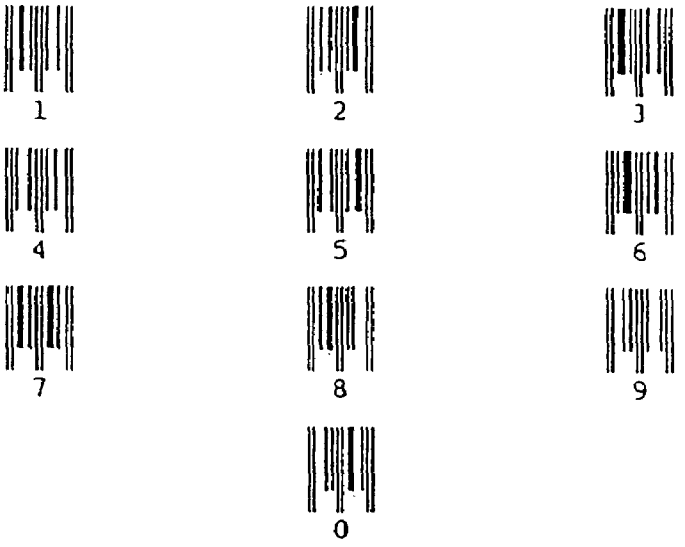


FIG. 5


1
2
3
4
5
6
7
8
9
0

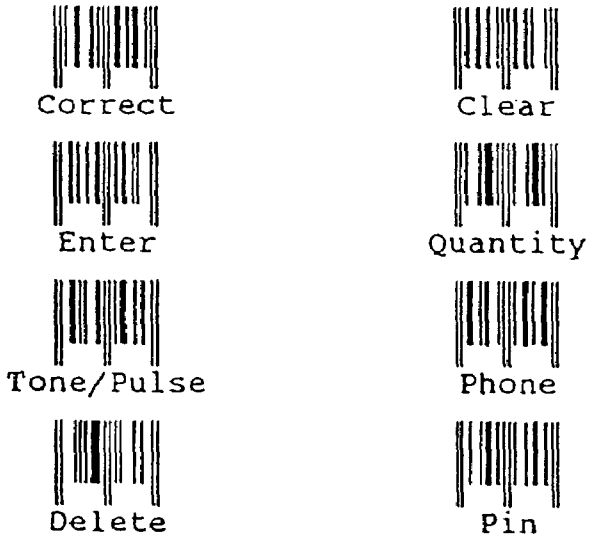

Correct
Clear
Enter
Quantity
Tone/Pulse
Phone
Delete
Pin

FIG. 6

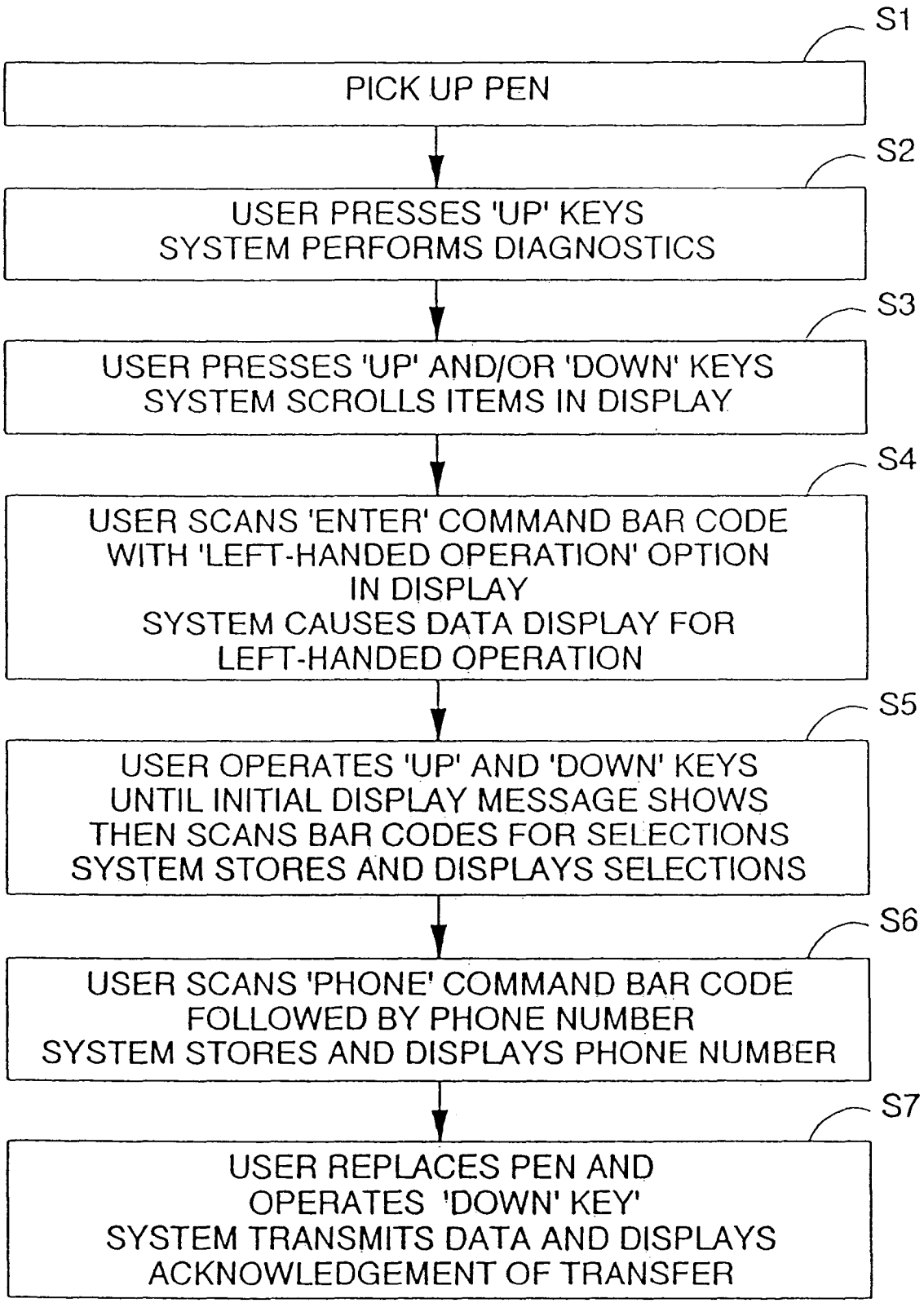

S1
PICK UP PEN
S2
USER PRESSES 'UP' KEYS
SYSTEM PERFORMS DIAGNOSTICS
S3
USER PRESSES 'UP' AND/OR 'DOWN' KEYS
SYSTEM SCROLLS ITEMS IN DISPLAY
S4
USER SCANS 'ENTER' COMMAND BAR CODE
WITH 'LEFT-HANDED OPERATION' OPTION
IN DISPLAY
SYSTEM CAUSES DATA DISPLAY FOR
LEFT-HANDED OPERATION
S5
USER OPERATES 'UP' AND 'DOWN' KEYS
UNTIL INITIAL DISPLAY MESSAGE SHOWS
THEN SCANS BAR CODES FOR SELECTIONS
SYSTEM STORES AND DISPLAYS SELECTIONS
S6
USER SCANS 'PHONE' COMMAND BAR CODE
FOLLOWED BY PHONE NUMBER
SYSTEM STORES AND DISPLAYS PHONE NUMBER
S7
USER REPLACES PEN AND
OPERATES 'DOWN' KEY'
SYSTEM TRANSMITS DATA AND DISPLAYS
ACKNOWLEDGEMENT OF TRANSFER

FIG. 7

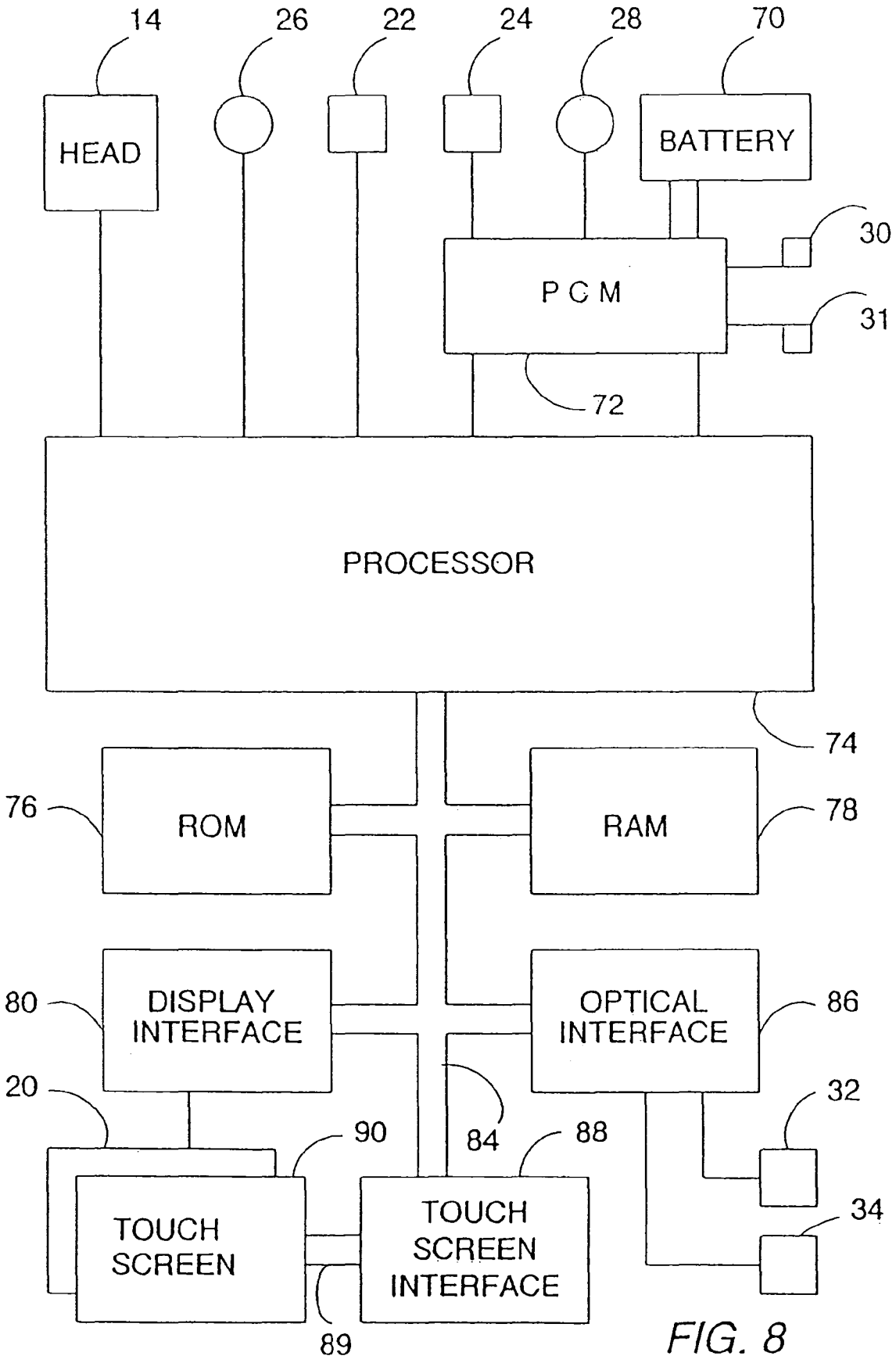

14
26
22
24
28
70
HEAD
BATTERY
30
PCM
31
72
PROCESSOR
74
76
ROM
RAM
78
80
DISPLAY INTERFACE
OPTICAL INTERFACE
86
20
32
90
84
88
TOUCH SCREEN
TOUCH SCREEN INTERFACE
34
89

FIG. 8

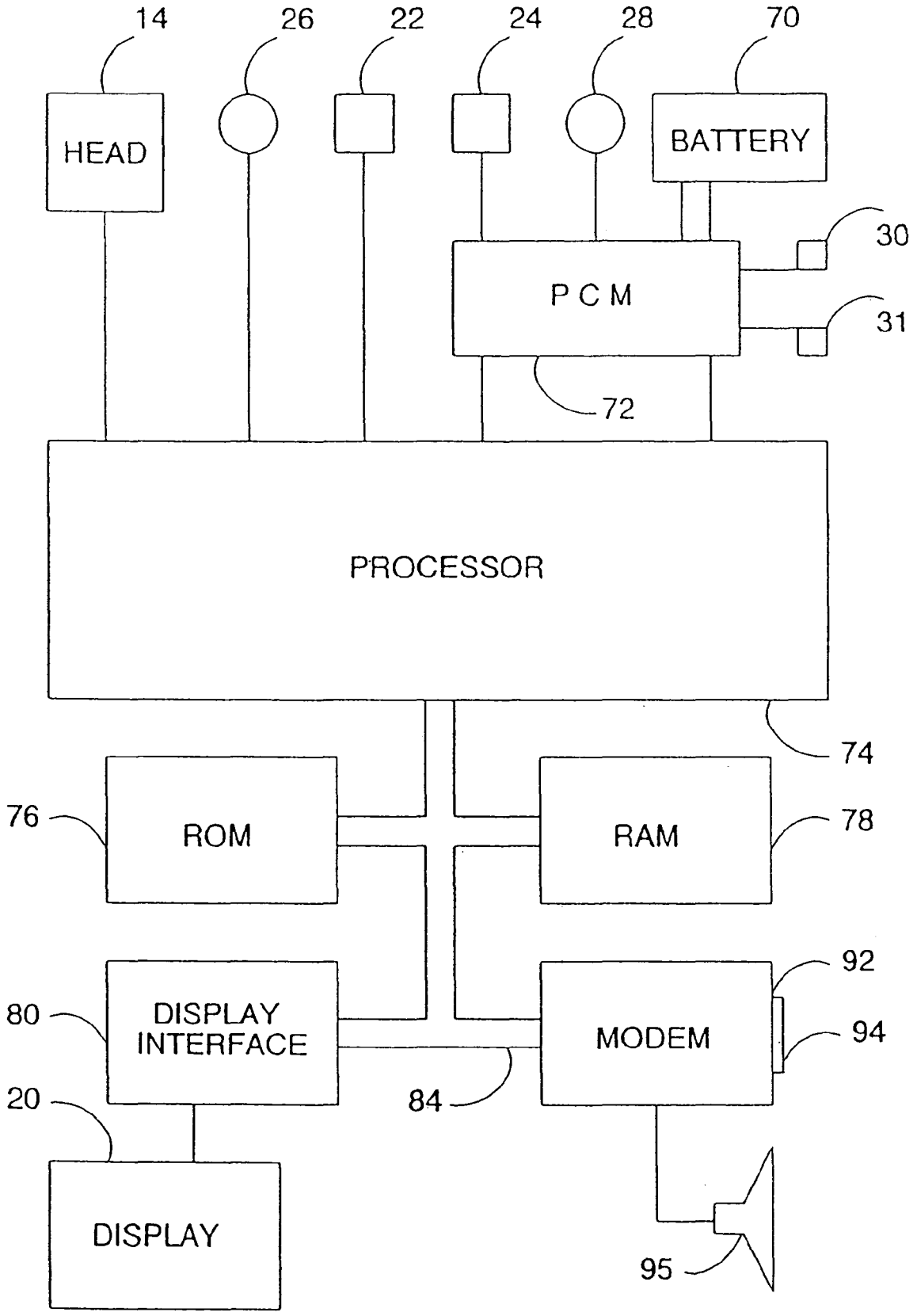

14
26
22
24
28
70
HEAD
BATTERY
30
P C M
31
72
PROCESSOR
74
76
ROM
RAM
78
92
80
DISPLAY INTERFACE
MODEM
94
84
20
DISPLAY
95

FIG. 9

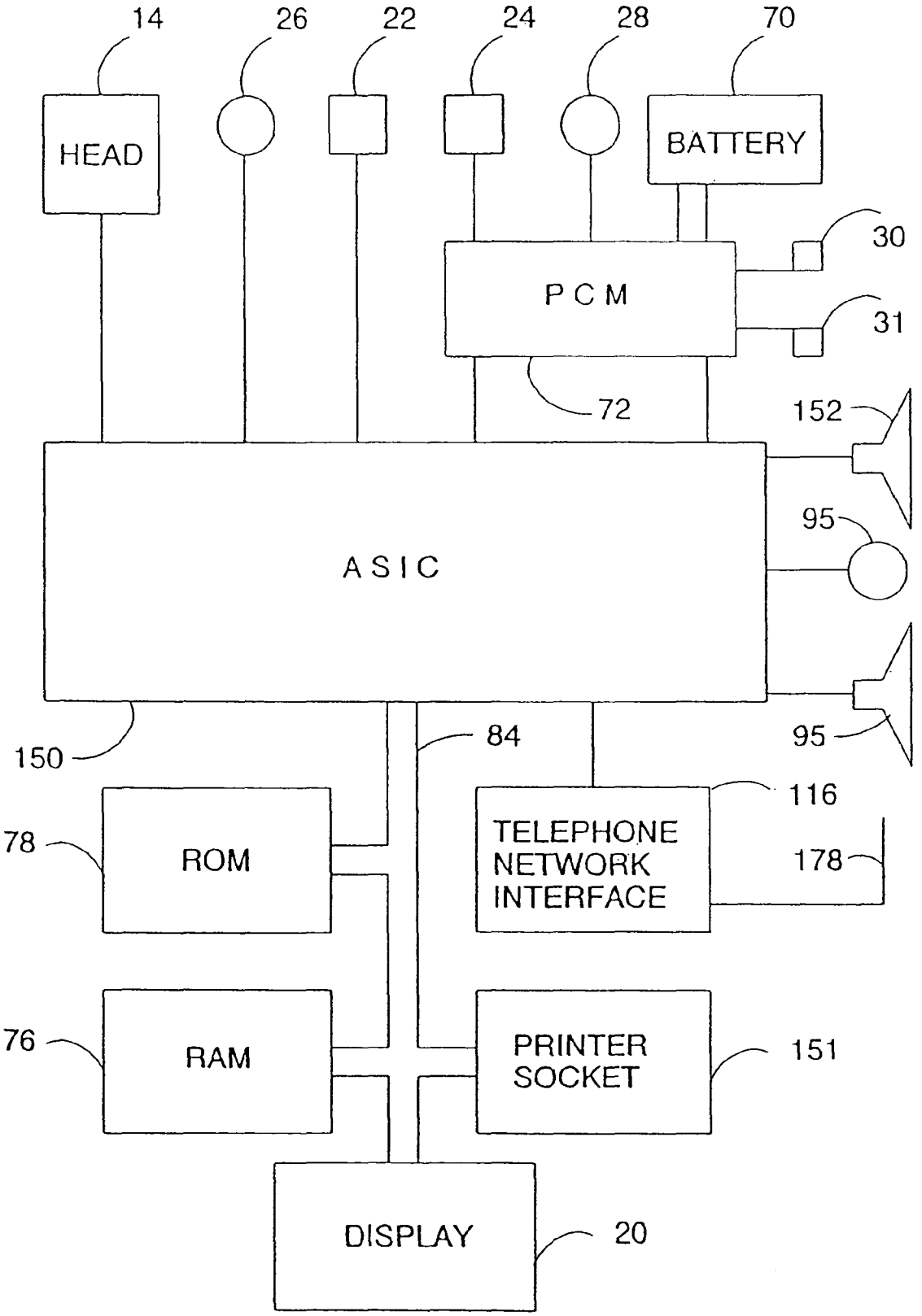

14
26
22
24
28
70
HEAD
BATTERY
30
P C M
31
72
152
ASIC
95
95
150
84
116
78
ROM
TELEPHONE NETWORK INTERFACE
178
76
RAM
PRINTER SOCKET
151
DISPLAY
20

FIG. 10

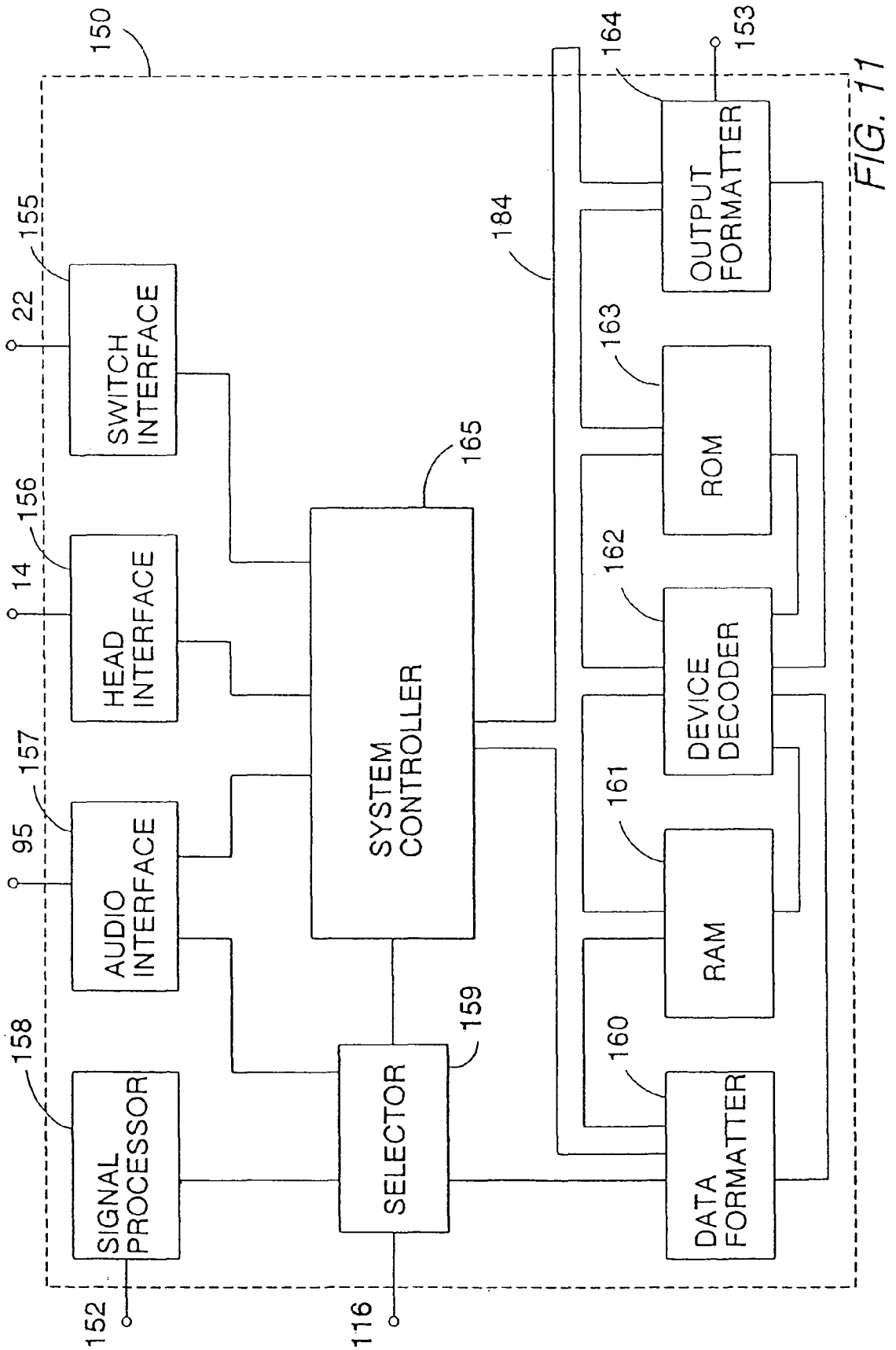

150
164
153
155
22
SWITCH INTERFACE
OUTPUT FORMATTER
184
163
ROM
165
156
14
HEAD INTERFACE
SYSTEM CONTROLLER
162
DEVICE DECODER
157
95
AUDIO INTERFACE
161
RAM
158
159
160
SIGNAL PROCESSOR
SELECTOR
DATA FORMATTER
152
116

FIG. 11

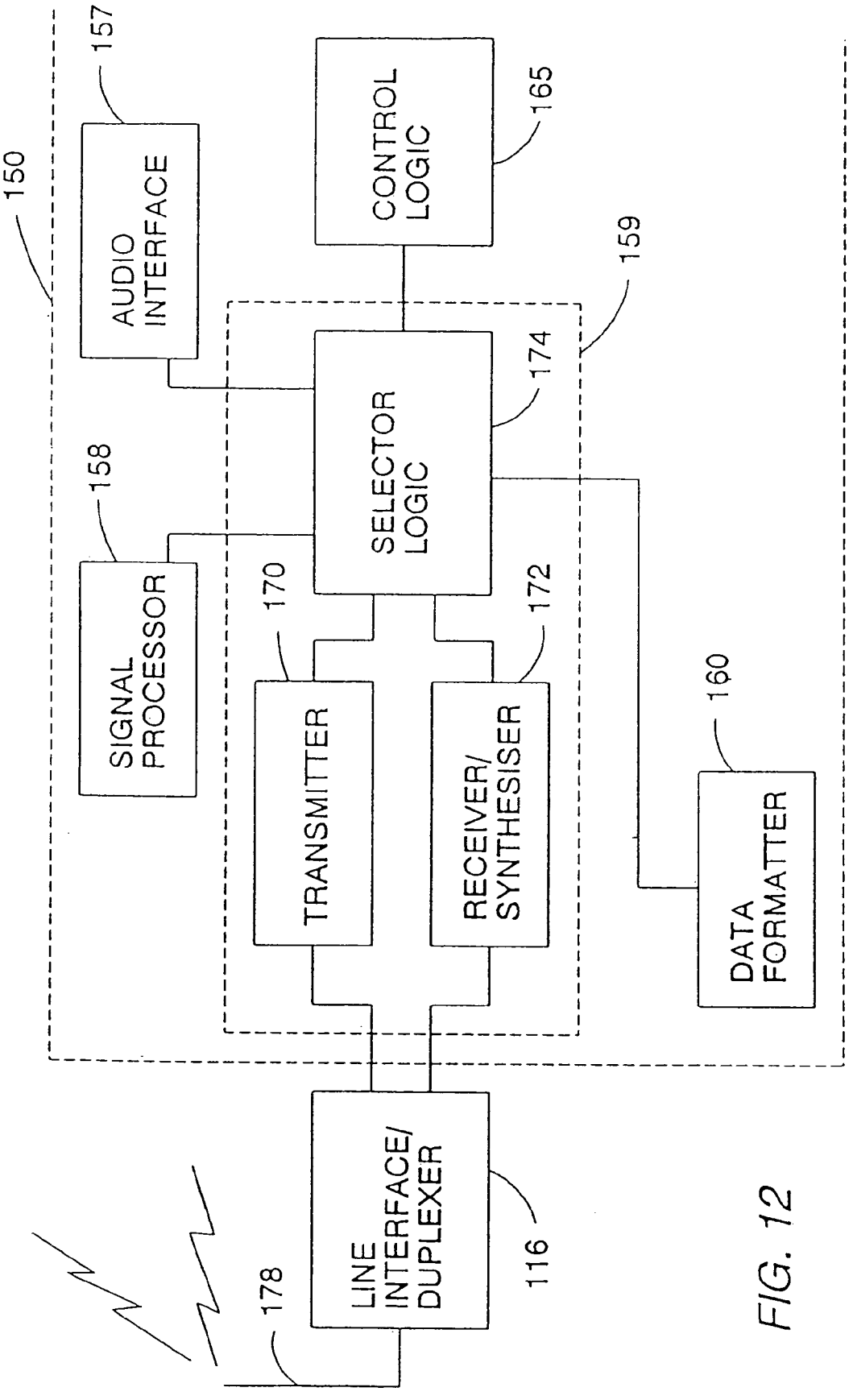

150
157
AUDIO INTERFACE
CONTROL LOGIC
165
159
174
SELECTOR LOGIC
158
SIGNAL PROCESSOR
170
TRANSMITTER
172
RECEIVER/ SYNTHESISER
160
DATA FORMATTER
178
LINE INTERFACE/ DUPLEXER
116

FIG. 12

HAND HELD TELECOMMUNICATIONS AND DATA ENTRY DEVICE

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is a continuation of U.S. patent application Ser. No. 09/548,565, filed Apr. 13, 2000 now abandoned, which is a continuation of U.S. patent application Ser. No. 08/619,682, filed May 23, 1996 (now U.S. Pat. No. 6,058,304), which was the National Stage of International Application No. PCT/GB94/02101, filed Sep. 27, 1994, each of which is hereby incorporated by reference.

FIELD OF THE INVENTION

This invention relates to data entry systems, to applications of such data entry systems and to equipment for use therewith.

BACKGROUND

UK patent GB-B-2,202,664 describes an example of an application for a data entry system for the automated ordering of merchandisable items. Merchandisable items are represented in a printed catalogue or other form of list and are associated with bar codes. A merchandise ordering unit comprises a bar code reader with a telephone transmission capability for use in selecting one or more items from the catalogue and transmitting electronically an order for the merchandise to a processing centre over the public telephone network. The orders for the merchandisable items received in this way are processed in the processing centre. As described, the hand held data entry terminal comprises a calculator-like processing unit with a pen-like bar code reader wand electrically connected to the processing unit via a flexible cable. The processing unit includes a display for displaying information and a telephone transmission capability for transmitting captured data via the telephone network. Although this system works well, it is rather bulky and can be somewhat inconvenient in use as it requires two handed operation, one hand for the processing unit and one hand for the wand. Alternatively, if the processing unit is not carried all the time, it needs to be located in a position where the display on the processing unit can be seen and the keys on the processing unit can be operated. It will be appreciated that particularly where the processing unit is being carried in the hand, operation of the keys on it while holding the wand requires considerable dexterity.

European patent application EP-A-0,094,571 describes a self-contained portable data entry terminal positioned within a portable wand-type enclosure. The wand contains a bar code optical reader, signal conditioning electronics, a microprocessor, a memory and a rechargeable battery. The optical reader is operable as a transmitter/receiver so that readout of data stored in the memory is possible. An example of the use of the portable data terminal is described in which captured bar code data can be output from the memory via the optical reader to an optical receiver and from there via an audio coupler to a telephone line for transmission to a remote station. Another example is described where the bar code data relates to items on a menu in a restaurant. Captured menu selections can be output from the memory via the optical reader to an optical receiver and from there via a computer to a printer in a kitchen. Also described is the programming of the portable data entry terminal using an optical transmitter to input data via the optical reader. The wand includes a beeper for indicating the correct reading of a bar code and the current memory loading. The wand described in EP-A-0,094,571 is relatively simple in construction, and although it is readily portable, it does not provide any confirmation of what has been read.

A further portable data entry terminal manufactured by Telxon Corporation is described in an article entitled "Telxon Corporation, Portable Data Collection and Entry Systems" published by McGraw-Hill in 1989 and referenced "R51-832-101 SKU/UPC Marking and Reading Equipment". The article describes various models of data entry terminals similar to that described in UK patent GB-8-2, 202,664. Data from the terminals can be transmitted to a remote station via various telecommunication options including direct connect modems and acoustic couplers. The data entry terminals have a generally rectangular format, similar to a large scientific calculator with a rectangular display and an array of keys. For most models, a separate bar code reader wand is provided which is connected to the data entry terminal via a flexible cable, requiring a two-handed operation as described above. One model PTC-620 has the same basic format as the other terminals, but is described as being for simple applications and features a snap-on reversible head for one-handed operation with either the left or the right hand. However, this terminal is still relatively bulky and cumbersome and in use it is easy inadvertently to operate one or more keys in the array of keys.

SUMMARY

An object of the present invention is to provide a data entry system which mitigates the problems of the prior art.

In accordance with an aspect of the invention, there is provided a data entry system comprising a hand held data entry unit, the hand held unit comprising a reading sensor for sensing commands and/or data and for producing input signals in response to the sensed commands and/or data, rewritable storage for information relating to selectable items, a controller connected to receive and process the input signals from the sensor for responding to the commands to control the hand held unit and/or to the data to select the item and a display screen for displaying a user readable representation of the commands and/or stored information for the selected item, and a telecommunications interface for telephonic transmission of information relating to a selected item or items from the storage to a remote processing centre and for telephonic transmission of information relating to selectable items from the remote processing centre to the storage.

The provision of a hand held unit having an integral sensor, control, storage, display means with a telecommunications interface enables the unit to be used in a particularly efficient and self-contained manner for the capture, processing, storage, display and transmission of data. The inclusion of the display in the hand held unit enables the user to verify the data being captured without taking his or her eyes off the areas in which data capture is taking place.

Preferably, the telecommunications interface is integral to the hand held unit. The provision of a telecommunications interface in the hand held unit enables captured data to be used for direct telephonic transmission of the captured data via a telephone network to a remote processing centre. It also allows for data and/or commands to be received from the remote data processing centre.

Preferably, the hand held unit includes a rechargeable power source. There can be provided a base unit separate from the hand held unit, wherein the base unit includes a

charger unit and the base unit and the hand held unit are provided with respective interconnectable electrical connectors for recharging the rechargeable power source.

In some embodiments of the invention, the data entry system can comprise a base unit separate from the hand held unit, wherein the base unit and the hand held unit are provided with a wireless data link which is operable for bidirectional data transfer between the hand held unit and the base unit, and wherein the base unit includes a telecommunications interface for telephonic transmission of information relating to a selected item or items from the storage to a remote processing centre and for telephonic transmission of information relating to selectable items from the remote processing centre to the storage. In this embodiment, the wireless data link preferably comprises, in the base unit and the hand held unit, optical transmitters and/or receivers which cooperate when the hand held unit is in the rest position to provide a two way optical data link for transferring data from the hand held unit to the base unit and/or from the base unit to the hand held unit. In other embodiments it could comprise respective radio frequency, rather than optical, transmitters and receivers, or indeed other types of transmitters and receivers.

In preferred embodiments of the invention, the telecommunications interface is an interface for connection to a wireless telephony network. This provides for a particularly advantageous implementation of the invention, which can then be used without the need to plug in the data entry system to, for example, a conventional wired telephone network.

In a preferred embodiment of the invention the telecommunications interface is a cellular telephone network interface. In this embodiment of the invention, particularly where the telecommunications interface is incorporated in the hand held unit, the data entry system can be used with the convenience, for example, of a portable cellular phone. Cellular telephone networks are now common place and give a very wide area of coverage. This facilitates the use of a data entry system in accordance with the invention in, for example, a user's home or workplace.

Alternatively, the telecommunications interface can be a satellite telephone network interface, or some other form of wireless telephone interface, for example a telephone interface for a telephone network based on highly localised transponder stations.

Where the telecommunications interface is intended to interface with an analogue telephone network, the telecommunications interface includes a modem.

By arranging that the reading sensor can be used for the input of commands for controlling the hand held unit, the number of user input means (e.g., keys) can be kept to a minimum, reducing the possibility of inadvertent operation. Preferably, there are provided one or two manually operable switches for scrolling the display in a first and/or second direction for selectively displaying a plurality of data stored in the storage. The scrolling of the display enables a large number of items to be accessed with a relatively compact display. In a preferred embodiment of the invention, the first and/or second switches are the only switches on the hand held unit. Preferably also, operation of the first and/or second switches in predetermined operational states of the hand held unit causes predetermined functions other than scrolling functions to be performed (e.g., powering-up or powering-down of the hand held unit). By the provision of only two keys on the hand held unit, the possibility of accidentally operating an incorrect key can be reduced, and also the hand held unit can be kept particularly compact.

Preferably, the hand held unit comprises a sensor for reading coded data, the controller being arranged to access the stored information for selectable items to determine natural language characters or images corresponding to the coded data for display. The invention finds particular, but not exclusive application to the reading of bar codes and/or binary dot codes, whereby the sensor is a bar code and/or dot code reader. It will be appreciated that the invention also applies to other forms of codes.

The hand held data entry unit may comprise a reading head including a reading sensor for producing input signals, wherein the reading sensor traces movements of the reading head and wherein the controller is responsive to signals from the sensor representative of the movements for identifying characters traced by the reading head as captured data. In this manner data entry can be made in an advantageous manner by tracing out the characters of the data to be input or characters representing commands for controlling the operation of the data entry system.

Preferably, the controller is user programmable to cause the captured data to be displayed on the display either in a first orientation suitable for reading displayed data when the hand held unit is held in a user's right hand, or in a second orientation suitable for reading displayed data when the hand held unit is held in a user's left hand. In a preferred embodiment the display has a substantially rectangular display screen with a longitudinal axis arranged substantially parallel to a longitudinal axis of the hand held unit. For example, for right handed operation, a string of characters could, for example, be displayed along the display from an end nearest to the sensor to the end furthest therefrom, whereas for left handed operation, the same string of characters would be displayed from the end of the display furthest from the sensor to the end nearest thereto.

A data entry system comprising a hand held unit with or without a base unit as described above, can also include means for displaying a plurality of selectable items with associated data sources for user selection of an item by operation of the hand held unit and a remote processing centre for processing user selections transmitted from the hand held unit. The controller in the hand held unit is preferably arranged to respond to appropriate commands input, for example via the reading sensor, to issue coded instructions via the telecommunications interface to the data processing centre and to receive programming data (e.g., relating to information for selectable items) from the programming centre for storage in the hand held unit.

The data entry system may additionally be arranged to provide the functions of a telephone to permit audio communication. In particular, if a cellular telephone interface is provided in a hand held unit, this unit can advantageously combine the functions of the data entry unit and a cellular telephone.

Accordingly, the invention also provides a data entry system additionally comprising means for displaying a plurality of selectable items with associated data sources for user selection of an item by operation of the hand held unit and a remote processing centre for processing user selections transmitted from the hand held unit. Preferably, the hand held unit is programmable remotely from the processing centre.

In a preferred embodiment of the invention, the hand held unit is configured as an elongate unit such that it may be held by a user in the manner of a pen or quill with the reading sensor being located in a reading head at or adjacent to one end of the hand held unit. The configuration of the hand held unit such that it may be held in the manner of a pen or quill

means that the unit can be held in a familiar and comfortable manner. Also, it facilitates the provision of user input means (e.g. switches) on the hand held unit to be located such that inadvertent operation thereof can easily be avoided.

Preferably the reading sensor is located in a reading head which is releasably attached to the hand held unit. This enables alternative types of reading head to be connected to the hand held unit and/or for faulty reading heads to be replaced easily.

The invention also provides a merchandising system comprising a data entry system of this type wherein the selectable items are merchandisable items and the remote processing centre initiates processing of user orders of the selectable merchandisable items.

Thus, a data entry system in accordance with the invention, especially a data entry system comprising a hand held unit including a telecommunications interface for use with a wireless telephony system, such as a cellular network telephone system, provides a particularly advantageous device for use, for example, for "home shopping". It enables the user to make shopping selections from a catalogue or from a series of options displayed on a television screen from the comfort of his or her home without the need to connect the device to a conventional telephone network. A hand held unit including a wireless telephone network interface such as a cellular network interface finds particular application where the user of the system is travelling from place to place and may need to perform data entry functions when they are far from a conventional wired telephone network socket.

A data entry system or a merchandising system as described above preferably includes a verification device in the form of a verification card (e.g., a credit, payment or other validation card) or like carrier carrying a verification bar code and/or dot code for verification of a user identity. Operation of the data entry system subsequent to an initial data capture operation can then be made dependent on the identification of authorised coded data.

The invention also provides a carrier for a plurality of data and/or command codes (e.g., bar and/or dot codes) for association with means for displaying a plurality of selectable items in a data entry system or a merchandising system as defined above, wherein the carrier carries a plurality of codes, each for a respective one of a plurality of natural language and/or numeric characters, and a plurality of commands for controlling the operation of the data entry or merchandising system, each code being associated with a visual representation of the corresponding natural language or numeric character or command and/or of a graphical representation thereof. This avoids the need for a complete coded data source to be associated with each selectable item in, for example, a catalogue, rather a composite code can be built up by capturing a desired sequence of individual codes. By including the command characters as well, the need for a lot of keys on the data entry device can be avoided.

As an alternative to the use of bar codes, other data representations could be used. Indeed, if the data entry device is provided with a reading sensor in the form of a camera or other scanning sensor rather than a bar code reader, and the data entry device is provided with character or image recognition logic, graphical or alphanumeric data representations can be captured directly. One application of an embodiment of the pen with a camera head as its sensor could be for fingerprint recognition.

As an example of a possible mode of operation, a command character (e.g., a bar code) can be read using the reading head (e.g., a bar code reading head) and this can be used to load down remote data from a remote station. This is particularly advantageous mode of operation where the data entry system can set up a telephone connection to the remote station automatically, for example where the data entry device has cellular telephone capabilities.

The carrier is preferably in the form of a sheet of material. The various characters and commands could be arranged in the manner of a standard typewriter keyboard layout to facilitate entry of individual codes to make up a desired code sequence (e.g., for a specific product code).

BRIEF DESCRIPTION OF THE DRAWINGS

Exemplary embodiments of the invention will be described hereinafter, by way of example only, with reference to the accompanying drawings in which like reference numerals are used for like features and in which:

FIGS. **1**A and **1**B are schematic views of a substantially pen-shaped hand held data entry device.

FIG. **2** is a schematic plan view of a base unit for use with the hand held unit of FIGS. **1**A and **1**B;

FIG. **3** is a schematic block diagram of the functional elements of a first example of a hand held data entry device as shown in FIGS. **1**A and **1**B;

FIG. **4** is a schematic block diagram of the functional elements of a base unit as shown in FIG. **2** for use with the hand held data entry device of FIGS. **1**A, **1**B and **3**;

FIG. **5** is an overview of a merchandising system using a data entry terminal such as is illustrated in the preceding Figures;

FIG. **6** represents a control card with bar codes for a number of numeric and control characters;

FIG. **7** is flow diagram illustrating an example of the operation of a data entry system as described with reference to FIGS. **1** to **6**;

FIG. **8** is a schematic block diagram of the functional elements of a second example of a hand held data entry device as shown in FIGS. **1**A and **1**B;

FIG. **9** is a schematic block diagram of the functional elements of a further, self-contained, hand held data entry device which is intended for use without a base unit;

FIG. **10** is a schematic block diagram of the functional elements of a further, self-contained, hand held data entry device for use without a base unit and intended, in particular, for use with a wireless telephone network such as a cellular network;

FIG. **11** is a schematic block diagram illustrating components in an ASIC forming part of the apparatus of FIG. **10**; and

FIG. **12** is a schematic block diagram illustrating the inter-relationship of functional elements of FIGS. **10** and **11**.

DETAILED DESCRIPTION OF EXEMPLARY EMBODIMENTS

FIGS. **1**A and **1**B are schematic views from above and below, respectively, of one embodiment of hand held data entry unit **10** which is substantially pen-shaped and which will hereinafter, for reasons of conciseness only, be referred to as the "pen **10**". The pen **10** is intended to be held for essentially one handed operation between the thumb and forefinger of either the left or right hand in the manner of a conventional, if rather thicker than usual, pen.

The pen **10** has an elongate body **12** with, in the present example, external dimensions of approximately 120 mm by 40 mm, although the dimensions may be larger or smaller as desired subject to technical limitations. A reading head **14**, for example a red or infra-red optical reading head (e.g., a

laser diode) suitable for reading bar codes is located at one end of the pen. Other types of reading head may be provided. The reading head is preferably-replaceable for interchanging types of reading head. A removable battery cover **16** covering a battery compartment is located at the other end of the pen. As an alternative to a compartment for removable batteries, a removable and/or fixed rechargeable battery pack could be provided instead. Also, the reading head in the present embodiment is arranged to read with a reading angle of between 0° to 45° to the normal to the bar code to be read.

On the upper surface of the pen shown in FIG. **1**A a display screen **20**, first and second microswitches **22** and **24**, a first indicator light **26** and a second indicator light **28** are located. The display screen **20** preferably comprises a conventional two-dimensional array of pixels which can be selectively activated in order to provide the display of a wide range of displayable items. However, in a low cost version of the pen **10**, the display may be configured only to display a predetermined range of characters and symbols, this reducing the complexity of the display and the controlling logic and thus reducing the cost as will be well understood by one skilled in the art.

Any suitable display technology can be used which enables the displayed information to be read over a wide enough angular range such that it can be read by the user when the pen is held at an angle suitable for reading a bar code. In this way it is not necessary to change the orientation of the pen in order to read the display. In view of the low power consumption and advantageous readability characteristics, a 2 line by 16 character supertwist LCD display screen is employed in the preferred embodiment giving a viewing area of approximately 60 mm by 16 mm with a character size of approximately 3 mm by 5.5 mm. The display is preferably located towards the end of the pen **10** opposite to the reading head **14** with its longitudinal axis substantially parallel to the longitudinal axis of the pen **10**.

With the pen **10** held between thumb and forefinger with the user's hand below the pen as viewed in FIG. **1**A, and with the pen held at an angle of, say, 30" to the normal of a bar code to be read, (assuming that the normal to the bar code is generally in the direction of the line of sight of the user), the display screen can be read without difficulty.

The switches **22** and **24** are used to control basic operations of the data entry system and for control of the sequential display of stored information (scrolling of the display) as will be explained later. The indicator light **26** is used to report successful scanning of a bar code. The indicator light **28** is used when rechargeable batteries (**70**, FIG. **3**) are inserted in the battery compartment to indicate that the batteries are charging.

On the lower surface of the pen **10** shown in FIG. **1**B, an optical transmitter **32** and an optical receiver **34** are provided in a shallow recess **33**. Also, provided on the lower surface are a locating groove **36** and first and second electrical contacts **30** and **31**. The optical transmitter **32** and the optical receiver **34** are used in combination with an optical receiver **62** and optical transmitter **64**, respectively, on a base unit **40** to be described with reference to FIG. **2**, for the transfer of data between the pen **10** and the base unit **40**. The locating groove **36** is used correctly to position the pen **10** with respect to a corresponding ridge in a cradle **56** on the base unit **40** when the pen **10** is placed in that cradle **56**. The cradle **56** defines a rest position for the pen **10** on the base unit **40**. The first and second contacts **30** and **31** are arranged to cooperate with corresponding contacts **60** and **61** in the cradle **56** on the base unit **40** for charging the rechargeable batteries.

Turning now to FIG. **2**, this illustrates a plan view of a base unit **40** for use with the pen **10** of FIGS. **1**A and **1**B.

The base unit includes a generally rectangular housing **42** with a raised portion **44** containing a power supply unit (**102**, FIG. **4**) which receives electrical power via a mains supply cable **45** and a mains switch **46**. The mains switch **46** is located on the right hand side of the base unit housing **42**. Cooling slots **47** for the power supply unit (**102**, FIG. **4**) are provided in the upper surface of the raised portion **44**. Further slots **48** in the upper surface of the base unit housing **42** are located over a speaker (**110**, FIG. **4**) for relaying information to the user of the data entry system. The rear of the housing **42** is also provided with a socket **52** for a standard telephone plug for connecting the base unit **40** to a telephone line **50** and a standard serial connector **54** (e.g., an RS232 connector) for connecting the base unit to, for example, a personal computer (not shown). A manual switch **53** can be provided for switching between the telephone line and the serial connector. It will be appreciated that a parallel connector could be provided instead of, or in addition to, the serial connector **54**. A separate telephone socket **55** can be provided for the connection of a standard telephone handset to the base unit.

Towards the front of the base unit housing **42**, a recess is formed which is configured as a cradle **56** for receiving the pen **10**.

An optical receiver **62** and an optical transmitter **64** are located in the bottom of the recess for cooperating with the optical transmitter **32** and optical receiver **34**, respectively, when the pen is located in the cradle **56**. The optical receiver **62** and the optical transmitter **64** are surrounded by a wall **63** which also forms a shroud between the optical receiver **62** and the optical transmitter **64**. The wall **63** cooperates with the recess **33** in the pen **10** to prevent external light reaching the optical link, and the shroud between the optical receiver **62** and the optical transmitter **64** prevents light from the two optical paths between the pen and the base unit and between the base unit and the pen from interfering with each other. It will be appreciated that alternative configurations are possible, for example the wall could be provided on the pen and the recess on the base unit, although this could mean that the pen was less comfortable to use.

First and second base contacts **60** and **61** are also located in the recess for cooperating with the contacts **30** and **31** on the pen **10** when it is inserted in the cradle **56**, thus enabling rechargeable batteries (**70**, FIG. **3**) in the pen **10** to be recharged. A locating ridge **58** is formed in the recess for cooperating with the locating groove **36** in the bottom of the pen **10** to enable to pen to be positioned correctly in the cradle **56** such that the optical transmitter/receiver pairs **32**/**62** and **64**/**34** and the contact pairs **30**/**60** and **31**/**61** are aligned correctly.

The pen **10** can also be provided with a socket for directly charging the internal rechargeable batteries using an AC mains supply or a DC supply. In the first case the pen will include a transformer, in the second a transformer/rectifier could be incorporated in, for example, a mains plug.

On a further raised portion **66**, one or two base unit indicator lights are provided. The first base unit indicator light **67** is for indicating the base unit is receiving mains power and is turned on. Optionally, the second base unit indicator light **68** can used to indicate that rechargeable battery (**70**, FIG. **3**) in the pen is being charged.

FIG. **3** is a schematic block diagram of the functional elements of the pen **10**. A processor **74** is preferably formed by a conventional programmable microprocessor (e.g., an Intel 80C31 12 MHz CMOS microprocessor with two

internal clocks, an Intel 80486, etc.), although a special purpose or specially configured unit (e.g. an ASIC) could alternatively be used (compare FIG. **10**). A read only memory (ROM) **76** is connected via a bus **84** to the processor **74** for the storage of control programs and data. The ROM **76** can be implemented by any appropriate technology, for example by a flash PROM. A random access memory (RAM) **78** (for example a 128K low power static RAM, or higher capacity RAM, e.g, a 256K, 512K . . . 5 Mb, etc., RAM) is connected to the processor via the bus **84**. The RAM **78** is used as working storage and for the storage of data captured using the reading head **14**. A display interface **80**, which connects the display **20** to the bus **84**, responds to display instructions from the processor to drive the display in a conventional manner. An optical interface **86** is connected to the bus to convert data to be transmitted into signals for driving the optical transmitter **32**, and converts signals from the optical receiver **34** into data to be passed to the bus **84**.

In the present embodiment, other connections are made directly to the processor rather than via the bus. Thus, in the present embodiment, signals relating to data captured by the reader head **14** are passed directly to the processor **74** to be processed.

The manual switch **22** is also connected directly to the processor. In use this switch serves as a "scroll-down" key. The second manual switch **24**, which in use serves as a "scroll-up" key, is, however, connected to the processor via a power control module (PCM) **72**. This is because the switch **24** also serves as a "power-up" key for turning the pen on or powering it up after it has been powered down. The power control module **72** responds to operation of the key **24** in a powered down state to connect the battery **70** to the processor **74**. The power control module **72** also controls the charging of the battery **70** when the contacts **30** and **31** are connected to the corresponding contacts **60** and **61** in the cradle **56** of the base unit **40**. The indicator light **67** (e.g., an LED or NEON) is connected to the processor **74** and indicates when the base unit is connected to the mains. The optional indicator light **68** (e.g., an LED or NEON) is connected to the power control module **72** to indicate when the battery **70** is being charged.

The processor is programmed by means of control programs and data stored in the ROM **76** and, in use, in the RAM **78**, to receive signals from the reading head **14**, to interpret those signals and to derive data therefrom which are displayed on the display **20** and stored in the RAM **78** for subsequent transmission via the optical interface as will be described in more detail below.

FIG. **4** is a schematic block diagram of the functional elements of the base unit **40** of FIG. **2**. A power supply module **102** is connected to a mains supply via the switch **46** and the supply cable **45**. The power supply unit **102** is also connected to the contacts **60** and **61** so that, when the pen **10** is located in the cradle **56**, the battery **70** can be recharged. The power supply unit **102** also supplies power to the other elements of the base unit via supply lines which are represented schematically (for reasons of drawing simplicity) by the arrows **104**.

A modem **100** is connected via an optical link **106** to an optical receiver **62** and an optical transmitter **64**. The optical interface **106** converts signals from the optical receiver **62** to data to be passed to the modem **100** and converts data from the modem **100** to signals to be transmitted by the optical transmitter **64**. A further interface (e.g. a standard V24/RS232 interface—not shown) for connection to a personal computer (not shown) could also be provided. Also a socket for a connection to a standard telephone handset (not shown) could be provided. The modem **100** can be a conventional modem generally comprising a master control unit **112**, a data pump **114** and memory **118**. The master control unit **112** is connected to receive data from the optical interface **106** (and/or from a V24/RS232 interface, if a personal computer is connected). Data from the data pump **114** are coupled via a line interface **116** to the telephone line **50**. The data pump **116** is also connected via an audio interface **120** to a speaker **110** for monitoring the transmission of data via the telephone line **50**.

FIG. **5** is a schematic representation of a data entry network comprising a plurality of pens/base units **10**/**40** connected via respective telephone connections **50** (telephone lines, wireless telephone channels, etc) to a processing centre **108** where data transmitted from the individual pens/base units **10**/**40** are processed. In the preferred embodiment of the invention, the pens/base units **10**/**40** are used for the placing of orders for merchandise and the processing centre **108** processes those orders and dispatches them to the users.

FIG. **6** is a schematic representation of an example of a control card for use with the pen **10**. The card shows bar codes for the numerals 0 to 9 and for a set of commands. The command bar codes are used for controlling the operation of the pen **10**. The control card can be thought of as a keyboard extension for the pen **10**.

At this point it should be explained that the operation of reading a bar code is performed by the processor **74** in a conventional manner. Thus, where the head **14** comprises a red or infra-red light source and a light sensor, signals representing changing levels of reflected illuminations are supplied to the processor **74**. Firmware stored in the ROM **76**, or in other embodiments possibly hard-wired in the processor **74**, is used then to decode the changing levels of reflected illumination to generate a numerical value. On successful reading of a bar code the good read light **26** is illuminated.

The processor tests the numerical values to determine whether the sensed code relates to data or a command. A look up table containing the numerical values for individual commands (not shown) is configured in the ROM **76** and/or RAM **78**. By accessing this table, input commands can be identified. The controlling software is aware of which commands can be executed for the current processing state. On identifying a currently executable command, the processor **74** executes that command and causes the display of a human readable command description for user verification purposes. The processor causes an error message to be displayed on the display screen if a non-executable command (e.g., a command has been input at a wrong time) has been input.

If the code does not relate to a recognised command, it is treated as data. The data are then stored in RAM as the result of reading a bar code and are used to address a description of the item referenced by the bar code value from a further look-up table. If a description of the item corresponding to the bar code value is stored in the ROM **76** and/or the RAM **78** in a suitable data structure so that the bar code value can be used either directly or indirectly to address the appropriate description, then the item description can readily be displayed instead of or as well as the bar code value for user verification purposes. If the bar code is not read correctly, then an error message is displayed on the display screen.

The item description data can relate, for example, to items from a merchandising catalogue. In the this case the rewritable storage capacity of the pen (e.g. the RAM **78**) is chosen

to be sufficient to store all the items from one or more merchandising catalogues. If the data is stored in volatile memory, this data is downloaded from the remote processing centre via the telecommunications link on restoring power to the memory in the pen. Preferably, if volatile memory is used, power is supplied to the memory even when the pen is "switched off". An integral rechargeable back-up battery can be provided in addition to the battery **70** to maintain power to a volatile memory when the battery **70** is being changed. If non-volatile memory is provided, then this data can be retained during a period when no power is supplied to the memory. However, through the use of rewritable memory and control logic enabling the memory to be updated using data downloaded from the remote processing centre, it is possible to keep the pen's memory up to date on a full list of merchandisable items, including product description, availability, price, etc. Then on reading a bar code relating to an item stored in memory the display on the pen can indicate a description of the item corresponding to the code read, its availability and price. If the code read is not recognised, for example, the pen can be programmed automatically to call up the remote processing centre to check on whether an update of the pen's storage is needed when the pen is replaced in the base unit.

FIG. **7** is a flow diagram illustrating an example of a possible series of operations using an example of data entry system such as that described with reference to FIGS. **1** to **6**. It will be appreciated that other sequences and modes of operation may be provided in other embodiments of the invention.

In a first step, S**1**, the pen **10** is removed from the base unit **40**.

In step S**2**, "Up" key switch **24** is operated. The power control module senses operation of this key switch and powers up the processor **74**, which performs a series of diagnostic checks, calibrates itself and then displays an initial message (e.g., "Ready") on the display **20**.

In step S**3** the "Down" and "Up" scroll keys switches **22** and **24** are operated to scroll though a number of initial options pre-stored within the ROM **76** or the RAM **78** and presented on successive screens of data items on the display **20**.

In this example of operation, in step S**4**, when an option "Left-handed operation" is encountered on the screen, the pen is scanned over the "Enter" command bar code on the command sheet of FIG. **6**. Whereas for right-handed operation, where text is displayed in English, the text is displayed in sequence from the end of the display nearest to the reading head **14** towards the opposite end, for left-handed operation the text display is inverted with the text then reading from the end of the display furthest from the reading head to the end nearest thereto. It can be seen, therefore, that the text is displayed in an orientation appropriate for the user. If left-handed operation has already selected and it is desired to use the pen in a right-handed mode, then "Right-handed operation" can be selected by scrolling the display using the "Down" and "Up" key switches **22** and **24** and then scanning the "Enter" command bar code when the appropriate option is displayed.

Other options which could be provided in this manner could, for example, be the selected of one of a number of operating languages.

In step S**5**, the scroll key switches **22** and **24** are again operated until the option "Ready" is encountered once more. Then a series of merchandise selections can be entered by the user by scanning the bar codes for the desired merchandise selections and the command bar codes "Enter", "Clear", "Quantity", etc., as appropriate. As each bar code is scanned successfully, the good read indicator **26** lights and the data read by the bar code reader is displayed on the screen. Either the alphanumeric value of the bar code read is displayed or, if a description of the item corresponding to the bar code value is stored in the RAM or the ROM, then this can be displayed instead of or as well as the bar code value.

Step S**5** can be repeated as often as desired until all the desired items have been entered, or until the RAM **78** has become full or nearly full, in which case a "Memory full" error message is displayed on the display screen **20**.

If desired, the items entered and stored in the RAM **78** could be checked by selecting a "Check Entries" option with the scroll key switches **22** and **24**. In this case the items entered can then be checked in sequence using the scroll key switches **22** and **24**, and if necessary corrected by scanning the correct command bar code while the appropriate item is displayed.

In the example shown in FIG. **6**, however, after entering the desired items, a phone number is then entered in step S**6** by scanning the command bar code "Phone" followed by the number of the processing centre **108** to be called. As an alternative to entering separately the telephone number, this could be pre-stored in memory, or could alternatively be included in the "Phone" bar code.

After this, in step S**7** the pen is placed in the cradle on the base unit and the "Down" key switch **22** is pressed to download the data from the pen. This causes the data for the telephone number to be downloaded to the modem **100** via the optical link **106**. The downloading of the telephone number causes the base unit automatically to call the desired number and, once the normal modem handshaking is completed, to transfer the data stored in the RAM **78** in the pen **10**. Preferably, in addition to the actual data stored, the processor **74** in the pen **10** automatically adds error correcting codes to enable the processing centre **108** to verify that successful transmission has occurred. The processing centre **108** then sends a message to confirm (or otherwise) whether successful transmission occurred after checking the error correcting codes. This message is then displayed on the display **20** of the pen **10**.

It will be appreciated that the steps S**1** to S**7** illustrated above merely form one possible method of operation. In an alternative embodiment of the invention, the scrolling function is only used for stepping though items which have already been entered into the pen, whether in the form of selectable items downloaded from the remote processing centre and/or items selected by means of the reading head. All other command functions are input by reading appropriate command codes from a command sheet. For this embodiment therefore, a command sheet should include commands for left and right handed operation, or a command for changing handedness. Then, to change between left and right-handed operation, it is merely necessary to scan an appropriate command bar code.

In a final step (not shown in FIG. **7**). the pen is turned off by pressing the "Down" and "Up" scroll key switches simultaneously. It should be noted that the processor, which is provided with a date and time clock, is arranged to power-down the pen to conserve battery power if no bar codes are scanned and no key switches operated during a predetermined interval (e.g. 30 seconds). However, as mentioned above, power will be maintained to the RAM **76** if this is a non-volatile memory.

The software stored in the pen also permits the loading of data from the processing centre or another remote computer. The programming is performed using a series of commands

preceded by dot codes. The programming commands are thus known as "dot" commands and cover operations such as RAM PEEK, RAM POKE, ROM PEEK, DISPLAY, SENSE, GET INFO, GET FIRST ITEM, GET NEXT ITEM, GET PREVIOUS ITEM, AMEND ITEM, DELETE ITEM, CLEAR ORDER, CLEAR CATALOGUE, ADD CATALOGUE ITEM, and AMEND CATALOGUE ITEM. In this way, a significant amount of catalogue data and/or program software can be held in the processing centre and be sent to the pens only when required. Where programs are to be downloaded, rewritable program storage will be needed in the pen, for example by implementing the ROM **76** in flash PROM technology.

The processing centre can also send commands to a hand held unit to instruct the user to scan in a personal identification number (PIN) possibly with the scanning of a further verification number from, for example a verification device in the form of a verification card (e.g., a credit, payment or other validation card) or like carrier carrying a verification bar code and/or dot code for verification of a user identity. Alternatively, the verification device can be scanned prior to any connection to a remote processing centre. In this case a connection can then be made to the remote processing centre for verification of the user identity. Operation of the data entry system subsequent to an initial data capture operation can then be made dependent on the identification of authorised coded data and a PIN number.

FIG. **8** illustrates another example of a pen **10** in accordance with the invention. This example is substantially the same as the pen **10** described with reference to FIGS. **1** and **3**, apart from the addition of a touch sensitive screen **90** for the display **20**. A touch screen interface **88** couples the touch sensitive screen to the bus **84** so that data sensed by the touch sensitive screen can be communicated to the processor **74**. Although FIG. **8** shows a touch sensitive screen **90** (e.g., an overlay) separate from a conventional display screen, any applicable touch sensitive screen technology can be used, either though the use of an addition to an existing conventional display screen, or the use of a display screen with integral touch sensitivity. One or more touch sensitive areas can be defined on the touch sensitive screen area, in combination with the data displayed on the display screen, for the entry of commands and/or the selection of displayed items. In particular, the processor **74** can be arranged to display a menu of user selectable items and to be responsive to a location at which the screen is touched for input of a user selection of a menu item. The touch sensitive screen can then thus be used as a dynamic and reconfigurable user interface. Touch screen entry can be used in place of or in addition to the entry of commands by scanning the bar codes on the command bar code card.

FIG. **9** illustrates another example of a pen **10** in accordance with the invention. This example includes much in common with the pen **10** of FIG. **3**, except that here a modem **92**, a socket **94** for a standard telephone plug and a speaker **95** for monitoring transmissions during operation of the modem are provided in place of the optical interface **86** and optical transmitter and receivers **32** and **34**. In this example, therefore, data can be transmitted and received via a telephone line without the use of the base station, providing added portability. Preferably, a simplified base station is provided in the form of a charging unit for rechargeable batteries in the pen **10**. It will be appreciated that the pen **10** could also be provided with the touch screen facility of the pen **10** of FIG. **8**.

Although in the above embodiments, the pens **10** are intended for manual scanning of bar codes, it will be appreciated that they could also be used for reading other optically readable codes, such as binary dot codes, by the provision of appropriate control software for programming the processor **74**. Alternatively, in place of the sensor head **14** which is intended to be manually scanned, a self-scanning head could be provided.

The invention is also applicable to the reading of other coded data sources such as, for example, magnetic strips, graphical representations and/or alphanumeric characters, by the provision of an appropriate reading head and control logic.

Alternative removable heads could be attached to the tip of the pen by a screw, bayonet, friction or other appropriate attachment arrangement.

For example, the data entry pen could be provided with a reading head which is responsive to movement of the pen for tracing out desired codes and or commands. In particular, by the provision of a rolling ball in a holder in the reading head, of rotation sensing means in the manner of a personal computer mouse for tracing movements of the ball and suitable interpretation logic in software or special purpose hardware, for defining a series of vectors as the pen is moved over a surface and for performing pattern recognition on the resulting vector patterns to identify control and/or alphanumeric characters traced out by the pen head, it is possible directly to input information into the pen by "writing" down those characters. By limiting the range of characters to be recognised (e.g., corresponding to the numerals and commands shown in FIG. **6**) it is possible to use conventional pattern recognition techniques with relatively limited processing power and storage requirements. It will be appreciated that increased processing power and storage can be provided in the pen described above for the embodiments of FIGS. **1**, **3**, **8** and **9** by the use of a more powerful processor and increased memory capacity.

FIG. **10** illustrates a further embodiment of the invention. This further embodiment of the invention is similar to the embodiment of FIG. **9**, but this embodiment is intended for use with a wireless data transmission means, for example radio signals. In particular, the embodiment of FIG. **10** is intended for use with a cellular telephone network, although it could be adapted for use with some other form of wireless telephone system, for example a satellite based telephone network.

The embodiment of FIG. **10** is intended to be used independently of a base unit and to contain all the necessary functionality for independent operation. In one alternative the hand held unit is provided with a rechargeable battery pack **70**, which can be removed from the hand held unit for recharging. In another alternative the hand held unit is provided with a fixed rechargeable battery pack **70**. In the latter alternative, and optionally in the former alternative, a mains voltage charging socket and transformer/rectifier can be provided in the hand held unit or the battery pack for receiving a mains lead for charging purposes rather than the low voltage connectors **30**/**31**. The low voltage DC charging connectors **30**/**31** can be configured in a socket for receiving an adapter lead, with a transformer/rectifier being provided, possibly incorporated in a plug, for connection to a mains socket. It will be appreciated that an adapter for connection to, for example, a 12 volt DC supply from a car may also be provided. As a further alternative, contactless recharging (for example by magnetic induction) could be employed.

The embodiment of FIG. **10** is implemented using a ASIC, although a conventional microprocessor and external hardware could be used. Likewise, it will be appreciated that the embodiments described with reference to the previous

Figures could also be implemented using a ASIC or other equivalent technology instead of a microprocessor.

In the embodiment of FIG. **10**, the ASIC (Application Specific Integrated Circuit) performs the majority of the necessary processing functions of the device including:

- accepting data from the head **14**;
- accepting data from the switches **22** and **24**;
- driving the indicator **26**;
- processing the data received from the head in the manner described with respect to the previous embodiments in order to extract the necessary information;
- controlling the flow of data in and out of the RAM **78**;
- controlling the flow of data in and out of the ROM **76**;
- interfacing with the power control module **72**;
- implementing the modem function for use with an analogue telephony system and also providing the necessary processing and control for integration with a digital telephony system and/or a cellular telephone network;
- controlling the loudspeaker **95** permitting the progress of calls to be monitored;
- accepting input from a microphone **152** to enable the pen in combination with the loudspeaker **95** to operate as a hand set for the purposes of audio telephony;
- controlling the flow of data to an optional printer socket (not shown) allowing a user to print out information relative to the code being scanned in a predefined format;
- controlling the output of data via an optical link **153** to a peripheral device (e.g., a printer) using for example, infra red light;
- controlling an interface to the display **20**, the display interface functions being performed in the ASIC.

The optical link **153** could be implemented using the optical link technology described above for interfacing a hand held unit with a base station. Indeed, the printer or other peripheral device could be implement as, or connected to a base station for the hand held unit.

FIG. **11** illustrates in more detail the configuration of the ASIC **150**.

The ASIC comprises the system controller **165** that controls the operation of the pen and of its associated components. In this embodiment system controller **165** consists of a microcontroller core incorporated into the ASIC. In other embodiments it could consist of some other control means using, for example, one or more finite state machines.

If the system controller **165** is a microcontroller core, then the data that controls its operation is stored in an internal ROM **163** together with the external ROM **76**. Alternatively, there could be no internal ROM **163** and the system controller **165** will then obtain all the data from the external ROM **76**. Alternatively, again, the internal ROM **163** could be used exclusively without an external ROM **78**. However, this would reduce the flexibility of the device. The use of the internal ROM **163** is advantageous where a pre-defined amount of the operations to be performed are fixed for all pen types, whilst the remainder of the operation is dependent on a particular model, to take account for example of language variations, number of switches used to enter data, etc. The RAM **161** in the ASIC can be used by the system controller **165** as a scratch pad RAM to speed up operations and in order to reserve the maximum amount of RAM **78** for the storage of the main data. This "main data" includes data identifying information relating to selectable items of, for example, a merchandising catalogue, which can be down loaded by telephonic transmissions from a remote station.

The microcontroller receives requests via the bus **84** which is connected to the external bus **84** illustrated in FIG. **10**. However, in an alternative embodiment where the system controller **165** consist of a number of finite state machines, then control would be by means of the fixed interconnection of the logic in the fixed state machines.

RAM **161** could be used as a short term data store leaving the RAM **78** to store the main data, the data in RAM **78** being retained by the battery **70**. An additional battery (not shown) could be provided for data retention to prevent the loss of data from the RAM **78** or the RAM **161** in the event of failure of the battery **70**.

The switch interface **155** responds to the operation of the switch **22** and ensures that the system controller **165** receives signals which are devoid of bounce (resulting for example from multiple operations of the switch due to the spring operation within the switch).

The head interface **156** carries out the necessary signal conditioning as required on receiving signals from the head **14**. The signal conditioning will depend on the exact configuration of the head and preferably comprises simple buffering of the data read. Alternatively, it could be implemented to provide at least some of the bar code conversion operations as will be apparent to one skilled in the art.

Selector **159** is controlled by the system controller **165** and functions in such a manner to allow the microphone **152** and the speaker **95** to provide standard audio telephony transmission or to allow the system controller to transfer the data over the telephony network using, in the present embodiment, conventional cellular telephone technology.

Thus the selector **159** enables the data entry device to be used as a conventional cellular telephone for the transmission of audio signals. In conventional telephony mode, the selector **159** takes signals from the microphone **152** that have been processed by the signal processor **158** and directs the output to the line interface **116**. The processing performed by the processor **158** can comprise, as will be apparent to one skilled in the art, conventional operations of buffering the microphone to filter out any frequencies not required and to amplify the signal to a suitable level. Received audio data is directed to the audio interface **157** which performs necessary signal conditioning before passing the signal to the speaker **95**.

In the data transfer mode, the selector takes the output from the data formatter **160**, which has prepared the data to be transmitted over the cellular telephone network, and directs this to the line interface **152**. The speaker **95** is then used to output any tones or audio messages indicating errors, correct operation, etc., again via the audio interface **157**.

Switching between modes can be accomplished using the keys and/or the scanning sensor of the hand held unit in the manner described above for the entry of data and/or commands.

The output formatter **164** prepares the data to be transmitted to a remote printer via an optical link **153** (not shown). This transmission could be in any one of a number of forms, for example, infra red light using technology as described above for interfacing the pen with a base unit. Alternatively, other remote link technology, for example a radio link, could be provided.

FIG. **12** illustrates aspects from FIGS. **10** and **11** to illustrate in more detail the incorporation of an example of a cellular telephone system within the data entry unit. The telecommunications interface **116** comprises a line interface/duplexer which is connected to an aerial **178**. The line interface/duplexer **116** is connected to a transmitter **170** and to a receiver/synthesizer **172** implemented in the selector

159. Also implemented in the selector **159** is selector logic **174** for connecting the transmitter **170** and the receiver/synthesizer **172** to the signal processor **158**, the audio interface **157**, the data formatter **160** and the control logic **165** within the ASIC **150**.

Although specific embodiments of the invention have been described hereinabove, it will be appreciated that many modifications and/or additions are possible within the scope of the present invention.

Thus, for example, although in the presently preferred embodiments described above the hand held unit is configured with the shape of a pen, it will be appreciated that the hand held unit could be configured in other shapes as desired in other applications, for example in the shape of a pistol.

Although in the examples of the pen and base unit described with reference to FIG. **1** to **4** and **8** an optical link between the pen and the base unit is provided, in an alternative embodiment other wireless data transmission means, for example radio signals, could be used, in the manner of a portable telephone of the type with a portable handset and a base unit.

The data from the memory of the pen (e.g., the complete list of items which could be ordered from a catalogue) could conveniently be output in alphanumeric form via a modem to a facsimile (fax) machine for printing the content of the memory.

In the preferred embodiments described above, catalogue data is down-loaded into the pen from a remote processing system by telephone, over the telecommunications interface. However, as an alternative to down-loading, for example a complete catalogue, via the telephone line, other data entry means could be provided for the bulk of the data, the telephone line then only being used for updating the stored data. For example the pen and/or the base unit as appropriate could be provided with a socket or connector or reader for a memory device (such as a plug-in ROM, a smart card, etc.).

Although no speaker is illustrated in the examples of the pen described with reference to FIGS. **3** and **8**, a speaker or other sound generator could be provided as in the FIGS. **9** and **10** embodiments for giving audio feedback to report on the correct reading, or otherwise, of a code. Thus, for example, when a code is correctly read, one beep can be sounded, and when a code is incorrectly read, two beeps could be sounded. Alternatively, appropriate synthetic or recorded voice messages could be output.

Although in the examples described above the plane of the display in generally parallel to the axis of the pen, the plane of the display **20** could be arranged to slope progressively towards the axis of the pen away from the head end of the pen to reduce the angle between the normal to the plane of the display and the line of sight of the user.

Also, although in the present examples two mechanical key switches are provided, in other embodiments one key switch only could be provided. Operating that key switch a predetermined number of times within a short period could be used to emulate the provision of two key switches for scrolling and other functions. More key switches could also be provided in other embodiments. For example, a numerical keypad could be provided. However, in preferred embodiments of the invention, the number of keys should be kept as low as possible for any particular application. As in the embodiments described above, two key switches are preferred. The control sheet or data carrier effectively forms a keyboard extension for the pen.

Although in the example of a card or other carrier shown in FIG. **6** a set of bar codes for only numeric and command codes are indicated, if desired a set of bar codes for the complete alphabet could be provided. Alternative arrangements of the codes would also be possible, for example a complete set of codes and corresponding characters could be arranged in the format of a standard typewriter keyboard layout. The codes could also be incorporated in the letters and numerals, for example extending as a strip across the letters and numerals. For example, a bar code could replace the cross bar in a capital "A", and similar modifications for the other letters of the alphabet.

Also, as mentioned above, in appropriate embodiments of the invention, codes other than bar codes or dot codes could be used. For example a symbol blob code could be used, this requiring about 1 Kbyte of storage for decoding purposes. Indeed, in other embodiments of the invention full character recognition (OCR) could be employed where the reading sensor is in the form of a camera or other scanning sensor incorporated in the reading head. With a camera and appropriate recognition logic, the pen could be used, for example, for fingerprint recognition, either as an aim in itself, or for user validation purposes.

In a merchandising system, where bar codes or other codes are associated with merchandisable items, this could be achieved simply by means of a printed catalogue, or some other form of list, or as a result of codes applied to examples of the products in question, or as a result of codes displayed, for example, on a TV screen with images relating to those products. The only requirement is that the display of the codes are readable by the data entry system of the present invention.

Features from the respective embodiments of the invention described above could also be combined as desired to provide a configuration appropriate for a particular application.

Thus, for example, the audio telephony functions described with reference to the embodiment of FIGS. **10** to **12** could be incorporated in the hand held or base unit, as appropriate, of the other embodiments of the invention.

Although in the specific embodiments described above the telecommunications interface for the telephonic transmission of information is only provided in a hand held unit where no base unit with a telecommunications interface is provided, it will be appreciated that a hand held unit with a telecommunications interface could be combined with a base unit also having a telecommunications interface, either of the same or a different type.

The invention claimed is:

1. A data entry system comprising a hand held data entry unit, said hand held unit comprising:

a reading sensor for sensing commands and/or data and for producing input signals in response to said sensed commands and/or data;

rewritable storage programmable with information relating to selectable items;

a controller connected to receive and process said input signals from said sensor, said controller being arranged to respond to said commands to control said hand held unit and to said data to select a said item;

a display screen for displaying a user readable representation of said commands and displaying information relating to said item from said rewritable storage;

a telecommunications interface for telephonic transmission of information relating to a selected item or items from said storage to a remote processing center via a telecommunications network and for telephonic reception of information relating to said selectable items from said remote processing center to said storage via

said telecommunications network, wherein said telecommunications interface is a telecommunications line interface integral to said hand held unit and directly connects said hand-held unit to said telecommunications network; and

a carrier for a plurality of data and/or command codes for association with means for displaying a plurality of selectable items, wherein said carrier carries a plurality of codes, each for a respective one of a plurality of natural language and/or numeric characters and a plurality of commands for controlling operation of said data entry or merchandising system, each code being associated with a visual representation of the corresponding natural language or numeric character or command and/or of a graphical representation thereof.

2. A data entry system according to claim **1**, wherein said codes are bar and/or dot codes and/or other product identifications.

3. A portable hand held computer, wherein said hand held computer is capable of use by a user as a data entry device and as a portable wireless telephone for voice transmission and reception, said hand held computer comprising:

memory, wherein said memory is operable for retaining information input by the user, operable for retaining downloaded information, and operable for retaining information for updating downloaded information previously retained in said memory;

a manually operable key switch for input of information;

a display interface comprising a touch sensitive screen, wherein said display interface is operable to display user commands, operable to display information retained by said memory, and operable to display a list of user selectable items comprising merchandisable items, and to selectively display information relating to one or more of said items;

an antenna;

a rechargeable power supply;

a sensor operable to sense and capture data wherein said sensor is a camera;

a wireless telecommunications interface operable directly to connect said hand held computer via said antenna to a wireless telecommunications network and operable for transmission and reception of voice, data, and information, wherein said wireless telecommunications interface is operable to transmit data captured by said sensor; an optical interface operable to establish an optical datalink for the transmission and reception of information from and to said hand held computer;

a controller coupled to said display interface, key switch, memory, rechargeable power supply, optical interface, sensor, and wireless telecommunications interface; and

a speaker and a microphone configuring said hand held computer for use as a telephone handset;

wherein said display interface, antenna, key switch, rechargeable power supply, wireless telecommunications interface, memory, controller, optical interface, sensor, speaker, and microphone comprise a self-contained assembly; and, wherein said hand held computer is operable:

to download from a remote processing center via said antenna and at least said wireless telecommunications network information relating to one or more merchandisable items for retention in said memory;

to transmit data relating to one or more of said merchandisable items from said memory to said remote processing center via said antenna and at least said wireless telecommunications network, and to download information relating to one or more of said merchandisable items from said remote processing center via said antenna and at least said wireless telecommunications network in response to a said transmission of data;

to download, via said antenna and at least said wireless telecommunications network in response to entry of a user command, information from said remote processing center for retention in said memory to update information previously retained in said memory for one or more of said merchandisable items; and

as a portable wireless telephone for voice reception and transmission.

4. A portable hand held computer according to claim **3** wherein said hand held computer comprises a connector interface operable to connect said hand held computer to a separate personal computer for inputting and outputting information to or from said hand held computer, said connector interface comprising a part of said self-contained assembly.

5. A portable hand held computer according to claim **3** wherein said hand held computer is operable using said wireless telecommunications interface to receive a request from a said remote processing center for the user to input user identification information for utilization by said remote processing center.

6. A portable hand held computer according to claim **5** wherein said user identification information comprises a personal identification number.

7. A portable hand held computer according to claim **5** wherein said user identification information comprises a credit card number.

8. A portable hand held computer according to claim **5** wherein said hand held computer is operable, subsequent to an initial input of user identification information after a connection to a said remote processing center, for subsequent use with said remote processing center which is dependent on the user identification information.

9. A portable hand held computer according to claim **3** wherein said hand held computer comprises a connector interface operable to connect said hand held computer to a separate personal computer for inputting and outputting information, and wherein said display interface, antenna, key switch, rechargeable power supply, wireless telecommunications interface, memory, controller, optical interface, sensor, speaker, microphone, and connector interface comprise a self-contained assembly, and wherein said hand held computer is operable using said wireless telecommunications interface to receive a request from a said remote processing center to the user to instruct the user to input user identification information for utilization by said remote processing center.

10. A portable hand held computer according to claim **9** wherein said user identification information comprises a personal identification number.

11. A portable hand held computer according to claim **9** wherein said user identification information comprises a credit card number.

12. A portable hand held computer according to claim **9** wherein said hand held computer is operable, subsequent to an initial input of user identification information after a connection to a said remote processing center, for subsequent use with said remote processing center which is dependent on the user identification information.

13. A portable hand held computer according to claim **3** wherein said computer comprises one or two manually operable switches for scrolling said display in a first and/or

second direction for selectively displaying said selectable items, and wherein operation of one of said switches in predetermined operational states of said hand held computer causes predetermined functions other than scrolling to be performed.

14. A portable hand held computer according to claim **3** comprising a verification device in the form of a verification card or like carrier carrying a verification code to verify user information.

15. A portable hand held computer according to claim **3** that is operable to provide audio feedback to the user to indicate input of information via a said manually operable key switch, and further comprises a plurality of manually operable key switches arranged as a numerical keypad.

16. A portable hand held computer according to claim **4** wherein said hand held computer is operable to connect to a said separate personal computer via said connector interface or said optical interface, and said separate computer has a separate telecommunications interface.

17. A portable hand held computer according to claim **3** wherein said display interface is a reconfigurable user interface that is operable to display different information or data depending on user input.

18. A portable hand held computer according to claim **4** wherein said connector interface is also operable to connect said hand held computer to a source for recharging the rechargeable power supply.

19. A portable hand held computer according to claim **3** wherein said wireless telecommunications interface is operable to download information to update information describing one or more of said merchandisable items previously retained wherein such information has changed or has not changed.

20. A portable hand held computer according to claim **3** wherein said memory comprises one or more memory components.

21. A portable hand held computer according to claim **3** wherein said wireless telecommunications interface comprises one or more radio components.

22. A portable hand held computer according to claim **3** wherein said data captured by said sensor is one or more images.

23. A portable hand held computer according to claim **3** wherein said memory comprises rewritable storage.

24. A portable hand held computer according to claim **3** wherein said downloaded information is retained in said hand held computer at least in part by utilizing power from said rechargeable power source.

25. A portable hand held computer according to claim **4** wherein said connector interface is also operable to connect to a cradle.

26. A portable hand held computer according to claim **3** wherein said display interface displays a carrier of data and/or command codes comprising coded data in the form of alphanumeric characters, and said hand held computer is operable to read said coded data.

27. A portable hand held computer according to claim **3** wherein said optical interface is configured to connect to a printer or another hand held computer.

28. A portable hand held computer according to claim **3** wherein said hand held computer is operable by a user for initiating the purchase of one or more of said merchandisable items by means of the transmission of information from said memory via said antenna.

29. A portable hand held computer according to claim **3** further comprising a carrier for a plurality of data and/or command codes, wherein said carrier carries a plurality of command codes arranged in the format of a numerical keypad or a typewriter keyboard layout displayed via said display interface.

30. A portable hand held computer according to claim **3** wherein information retained in said memory for a list of merchandisable items is kept up to date via information downloaded from said remote processing center.

31. A portable hand held computer according to claim **3** wherein programs for use in said hand held computer are downloadable from a processing center remotely located from said hand held computer and are updateable via said wireless telecommunications interface from said processing center.

32. A portable hand held computer, wherein said hand held computer is capable of use by a user as a data entry device and configured to be held in one hand for operable use as a portable wireless telephone for voice transmission and reception, said hand held computer comprising:

memory, wherein said memory is operable for retaining information in response to input by the user, operable for retaining downloaded information, and operable for retaining information for updating downloaded information previously retained in said memory;

a manually operable key switch for input of information;

a display interface comprising a touch sensitive screen, wherein said display interface is operable to display user commands, operable to display information retained by said memory, and operable to display a list of user selectable items comprising merchandisable items, and to selectively display information relating to one or more of said items;

an antenna;

a rechargeable power supply;

a wireless telecommunications interface operable directly to connect via said antenna to a wireless telecommunications network and operable for transmission and reception of voice, data, and information;

a controller coupled to said display interface, key switch, memory, rechargeable power supply, and wireless telecommunications interface;

a speaker and a microphone permitting said hand held computer to be used as a telephone handset;

wherein said display interface, antenna, key switch, rechargeable power supply, wireless telecommunications interface, memory, controller, speaker, and microphone comprise a self-contained assembly; and wherein said hand held computer is operable:

to download from a remote processing center via said antenna and at least said wireless telecommunications network information relating to one or more merchandisable items for retention in said memory;

to transmit data relating to one or more of said merchandisable items from said memory to said remote processing center via said antenna and at least said wireless telecommunications network, and to download information relating to one or more said merchandisable items from said remote processing center in response to a said transmission of data;

to receive a request from said remote processing center to the user to input user identification information for utilization by said remote processing center; and

as a portable wireless telephone for voice reception and transmission.

33. A portable hand held computer according to claim **32** wherein said hand held computer comprises a connector interface operable to connect said hand held computer to a separate personal computer for inputting and outputting data

or information, and wherein said display interface, antenna, key switch, rechargeable power supply, wireless telecommunications interface, memory, controller, speaker, microphone, and connector interface comprise a self-contained assembly.

34. A portable hand held computer according to claim **32** wherein said hand held computer comprises an optical interface operable to establish an optical datalink for the transmission and reception of information from and to said hand held computer, and wherein said display interface, antenna, key switch, rechargeable power supply, wireless telecommunications interface, memory, controller, speaker, microphone, and optical interface comprise a self-contained assembly.

35. A portable hand held computer according to claim **32** wherein said hand held computer comprises a sensor operable to sense and capture data wherein said sensor is a camera, and wherein said display interface, antenna, key switch, rechargeable power supply, wireless telecommunications interface, memory, controller, speaker, microphone, and sensor comprise a self-contained assembly.

36. A portable hand held computer according to claim **32** wherein said hand held computer comprises a connector interface operable to connect said hand held computer to a separate personal computer for inputting and outputting data or information to or from said hand held computer, and comprises an optical interface operable to establish an optical datalink for the transmission and reception of information from and to said hand held computer, and wherein said display interface, antenna, key switch, rechargeable power supply, wireless telecommunications interface, memory, controller, speaker, microphone, optical interface, and connector interface comprise a self-contained assembly.

37. A portable hand held computer according to claim **32** wherein said hand held computer comprises a connector interface operable to connect said hand held computer to a separate personal computer for inputting and outputting data or information, comprises an optical interface operable to establish an optical datalink for the transmission and reception of information from and to said hand held computer, and comprises a sensor operable to sense and capture data wherein said sensor is a camera, and wherein said display interface, antenna, key switch, rechargeable power supply, wireless telecommunications interface, memory, controller, speaker, microphone, optical interface, sensor, and connector interface comprise a self-contained assembly.

38. A portable hand held computer according to claim **32** wherein said hand held computer using a said wireless telecommunications interface also is operable in response to entry of a user command to download information from said remote processing center for retention in said memory to update information previously retained in said memory for one or more of said merchandisable items.

39. A portable hand held computer according to claim **32** wherein said user identification information comprises a personal identification number.

40. A portable hand held computer according to claim **32** wherein said user identification information comprises a credit card number.

41. A portable hand held computer according to claim **32** wherein said hand held computer is operable, subsequent to an initial input of user identification information after a connection to a said remote processing center, for subsequent use with said remote processing center which is dependent on the user identification information.

42. A portable hand held computer according to claim **33** wherein said hand held computer using said antenna and at least said wireless communications network also is operable in response to entry of a user command to download information from said remote processing center for retention in said memory to update information previously retained in said memory for one or more of said merchandisable items.

43. A portable hand held computer according to claim **34** wherein said hand held computer using said antenna and at least said wireless communications network also is operable in response to entry of a user command to download information from said remote processing center for retention in said memory to update information previously retained in said memory for one or more of said merchandisable items.

44. A portable hand held computer according to claim **35** wherein said hand held computer using said antenna and at least said wireless communications network also is operable in response to entry of a user command to download information from said remote processing center for retention in said memory to update information previously retained in said memory for one or more of said merchandisable items.

45. A portable hand held computer according to claim **36** wherein said hand held computer using said antenna and at least said wireless communications network also is operable in response to entry of a user command to download information from said remote processing center for retention in said memory to update information previously retained in said memory for one or more of said merchandisable items.

46. A portable hand held computer according to claim **37** wherein said hand held computer using said antenna and at least said wireless communications network also is operable in response to entry of a user command to download information from said remote processing center for retention in said memory to update information previously retained in said memory for one or more of said merchandisable items.

47. A portable hand held computer, wherein said hand held computer is capable of use by a user as a data entry device and configured to be held in one hand for operable use as a portable wireless telephone for voice transmission and reception, said hand held computer comprising:

memory, wherein said memory is operable for retaining data or information in response to input by the user, operable for retaining downloaded information, and operable for retaining information for updating downloaded information previously retained in said memory;

a manually operable key switch for input of information;

a display interface, wherein said display interface is operable to display user commands, operable to display information retained by said memory, and operable to display a list of user selectable items comprising merchandisable items, and to selectively display information relating to one or more of said items;

an antenna;

a rechargeable power supply;

a sensor operable for sensing user commands or data;

a wireless telecommunications interface operable directly to connect via said antenna to a wireless telecommunications network and operable for transmission and reception of voice or data, wherein said wireless telecommunications interface is operable to transmit data captured by said sensor;

a controller coupled to said display interface, key switch, memory, rechargeable power supply, sensor, and wireless telecommunications interface; and,

a speaker and a microphone permitting said hand held computer to be used as a telephone handset;

wherein said display interface, antenna, key switch, rechargeable power supply, wireless telecommunica-

tions interface, memory, controller, sensor, speaker, and microphone comprise a self-contained assembly; and wherein said hand held computer is operable:

to download from a remote processing center via said antenna and at least said wireless telecommunications network information relating to one or more merchandisable items for retention in said memory;

to transmit data relating to one or more of said merchandisable items from said memory to said remote processing center via said antenna and at least said wireless telecommunications network, and to download information relating to one or more of said merchandisable items from said remote processing center via said antenna and at least said wireless telecommunications network in response to a said transmission of data;

to receive a request from said remote processing center to the user to input user identification information for utilization by said remote processing center; and

as a portable wireless telephone for voice reception and transmission.

48. A portable hand held computer according to claim **47** wherein said hand held computer comprises a connector interface operable to connect said hand held computer to a separate personal computer for inputting and outputting data or information, and wherein said display interface, antenna, key switch, rechargeable power supply, wireless telecommunications interface, memory, controller, sensor, speaker, microphone, and connector interface comprise a self-contained assembly.

49. A portable hand held computer according to claim **47** wherein said hand held computer comprises a optical interface operable for an optical datalink to transmit information from said hand held computer and/or to receive information, and wherein said display interface, antenna, key switch, rechargeable power supply, wireless telecommunications interface, memory, controller, sensor, speaker, microphone, and optical interface comprise a self-contained assembly.

50. A portable hand held computer according to claim **47** wherein said sensor comprises a camera operable for sensing and capturing data, and wherein said display interface, antenna, key switch, rechargeable power supply, wireless telecommunications interface, memory, controller, speaker, microphone, and sensor comprise a self-contained assembly.

51. A portable hand held computer according to claim **47** wherein said hand held computer comprises a connector interface operable to connect said hand held computer to a separate personal computer for inputting and outputting data or information, and comprises a optical interface operable for an optical datalink to transmit data or information from said hand held computer and/or to receive data or information, and wherein said display interface, antenna, key switch, rechargeable power supply, wireless telecommunications interface, memory, controller, sensor, speaker, microphone, optical interface, and connector interface comprise a self-contained assembly.

52. A portable hand held computer according to claim **47** wherein said hand held computer comprises a connector interface operable to connect said hand held computer to a separate personal computer for inputting and outputting data or information, comprises a optical interface operable for an optical datalink to transmit information from said hand held computer and/or to receive data or information, and said sensor comprises a camera operable for sensing and capturing data, and wherein said display interface, antenna, key switch, rechargeable power supply, wireless telecommunications interface, memory, controller, speaker, microphone, optical interface, sensor, and connector interface comprise a self-contained assembly.

53. A portable hand held computer according to claim **47** wherein said user identification information comprises a personal identification number.

54. A portable hand held computer according to claim **47** wherein said user identification information comprises a credit card number.

55. A portable hand held computer according to claim **47** wherein said hand held computer is operable, subsequent to an initial input of user identification information after a connection to a said remote processing center, for subsequent use with said remote processing center which is dependent on the user identification information.

56. A portable hand held computer according to claim **48** wherein said hand held computer using said antenna and at least said wireless communications network also is operable in response to entry of a user command to download information from said remote processing center for retention in said memory to update information previously retained in said memory for one or more of said merchandisable items.

57. A portable hand held computer according to claim **49** wherein said hand held computer using said antenna and at least said wireless communications network also is operable in response to entry of a user command to download information from said remote processing center for retention in said memory to update information previously retained in said memory for one or more of said merchandisable items.

58. A portable hand held computer according to claim **50** wherein said hand held computer using said antenna and at least said wireless communications network also is operable in response to entry of a user command to download information from said remote processing center for retention in said memory to update information previously retained in said memory for one or more of said merchandisable items.

59. A portable hand held computer according to claim **47** wherein said sensor is comprised of said display interface and at least one or two manually operable keys on said hand held computer for sensing user commands or data via input caused by use of one or more of said keys, wherein one or more of said keys is operable to cause scrolling through items displayed via said display interface, one or more of said keys is operable to select one or more of said items, and one or more of said keys is operable to select a said command displayed via said display interface.

60. A portable hand held computer according to claim **47** wherein said sensor is comprised of said display interface comprising a touch sensitive screen for sensing input by the user.

61. A portable hand held computer, wherein said hand held computer is capable of use by a user as a data entry device and configured to be held in one hand for operable use as a portable cellular telephone for voice transmission and reception, said hand held computer comprising:

memory, wherein said memory is operable for retaining data or information in response to input by the user, operable for retaining downloaded information, and operable for retaining information for updating downloaded information previously retained in said memory;

a manually operable key switch for input of information;

a display interface, wherein said display interface is operable to display user commands, operable to display information retained by said memory, and operable to display a list of user selectable items comprising mer-

chandisable items, and to selectively display information relating to one or more of said items;

an antenna;

a rechargeable power supply;

a sensor operable for sensing user commands or data;

a wireless telecommunications interface operable directly to connect via said antenna to a wireless telecommunications network and operable for transmission and reception of voice or data, wherein said wireless telecommunications interface is operable to transmit data captured by said sensor, and is a cellular telephone interface;

a controller coupled to said display interface, key switch, memory, rechargeable power supply, sensor, and wireless telecommunications interface; and,

a speaker and a microphone permitting said hand held computer to be used as a telephone handset;

wherein said display interface, antenna, key switch, rechargeable power supply, wireless telecommunications interface, memory, controller, sensor, speaker, and microphone comprise a self-contained assembly; and wherein said hand held computer is operable:

to download from a remote processing center via said antenna and at least said wireless telecommunications network information relating to one or more merchandisable items for retention in said memory;

to transmit data relating to one or more of said merchandisable items from said memory to said remote processing center via said antenna and at least said wireless telecommunications network, and to download information relating to one or more of said merchandisable items from said remote processing center via said antenna and at least said wireless telecommunications network in response to a said transmission of data;

to download, via said antenna and at least said wireless telecommunications network in response to entry of a user command, information from said remote processing center for retention in said memory to update information previously retained in said memory for one or more of said merchandisable items;

to receive a request from said remote processing center to the user to input user identification information for utilization by said remote processing center; and

as a portable cellular telephone for voice reception and transmission.

62. A portable hand held computer operable as a data entry device and a portable wireless telephone by a user, comprising:

memory, wherein said memory is operable for retaining data or information in response to input by the user, operable for retaining downloaded data or information, and operable for retaining data or information for updating downloaded data or information previously retained in said memory;

a manually operable key switch for input of information;

a display interface, wherein said display interface is operable to display user commands, operable to display information retained by said memory, and operable to display a list of user selectable items comprising merchandisable items, and to selectively display information relating to one cc more of said items;

an antenna;

a rechargeable power supply;

a sensor operable to sense and capture data wherein said sensor is a camera;

a wireless telecommunications interface operable directly to connect via said antenna to a wireless telecommunications network and operable for transmission and reception of voice or data, wherein said wireless telecommunications interface is operable to transmit data captured by said sensor via said antenna;

a controller coupled to said display interface, key switch, memory, rechargeable power supply, sensor, and wireless telecommunications interface;

wherein said hand held computer is operable using said wireless telecommunications interface to download from a remote processing center information relating to one or more of said items for retention in said memory by utilizing at least said wireless telecommunications network, said hand held computer is operable using said wireless telecommunications interface to transmit data or information relating to one or more of said items from said memory to said remote processing center and to download information relating to one or more of said items from said remote processing center in response to a said transmission, said hand held computer using said wireless telecommunications interface also is operable in response to entry of a user command to download information from said remote processing center for retention in said memory to update information previously retained in said memory for one or more of said items, and said hand held computer is operable as a portable wireless telephone;

wherein said display interface, antenna, key switch, rechargeable power supply, wireless telecommunications interface, memory, controller, and sensor comprise a self-contained assembly; and wherein said assembly includes a speaker and a microphone permitting said hand held computer to be used as a telephone handset.

* * * * *

US007139591C1

(12) EX PARTE REEXAMINATION CERTIFICATE (7125th)

United States Patent
Callaghan et al.

(10) Number: US 7,139,591 C1
(45) Certificate Issued: *Oct. 27, 2009

(54) **HAND HELD TELECOMMUNICATIONS AND DATA ENTRY DEVICE**

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Reexamination Request:
No. 90/008,394, Feb. 9, 2007

Reexamination Certificate for:
Patent No.: **7,139,591**
Issued: **Nov. 21, 2006**
Appl. No.: **10/869,215**
Filed: **Jun. 15, 2004**

(*) Notice: This patent is subject to a terminal disclaimer.

Related U.S. Application Data

(63) Continuation of application No. 09/548,565, filed on Apr. 13, 2000, now abandoned, which is a continuation of application No. 08/619,682, filed as application No. PCT/GB94/02101 on Sep. 27, 1994, now Pat. No. 6,058,304.

(30) **Foreign Application Priority Data**

Oct. 13, 1993 (GB) 9321133.2

(51) **Int. Cl.**
H04B 1/38 (2006.01)

(52) **U.S. Cl.** **455/557**; 455/422.1; 455/556.1; 235/462.46; 235/472.02

(58) **Field of Classification Search** ..... None
See application file for complete search history.

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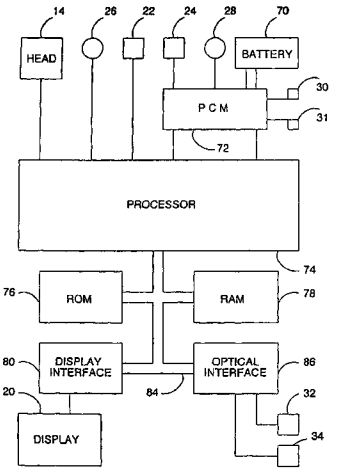
(57) **ABSTRACT**

A data entry system includes a hand held data entry unit having a reading sensor for sensing commands and/or data, rewritable storage for storing information relating to selectable items, a controller (a microprocessor or other processing circuitry) and a display screen for displaying a user readable representation of the commands and/or stored information for a selected item, and a telecommunication interface for the telephonic transmission of information relating to a selected item or items from the storage to a remote processing center and for the telephonic information relating to selectable items from the remote processing center to the storage. Preferably a telecommunications interface is provided in the hand held unit for cellular or other wireless telephony systems. The hand held unit can be configured to combine the data entry functions with those of audio telephony.



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EX PARTE REEXAMINATION CERTIFICATE ISSUED UNDER 35 U.S.C. 307

THE PATENT IS HEREBY AMENDED AS INDICATED BELOW.

Matter enclosed in heavy brackets [ ] appeared in the patent, but has been deleted and is no longer a part of the patent; matter printed in italics indicates additions made to the patent.

AS A RESULT OF REEXAMINATION, IT HAS BEEN DETERMINED THAT:

Claims **1**, **3**, **32**, **47**, **61** and **62** are determined to be patentable as amended.

Claims **2**, **4–31**, **33–46** and **48–60**, dependent on an amended claim, are determined to be patentable.

1. A data entry system comprising a hand held data entry unit, said hand held unit comprising:

a reading sensor for sensing commands and/or data and for producing input signals in response to said sensed commands and/or data;

rewritable storage *remotely* programmable with **[**information relating to**]** selectable items *from a catalogue of merchandise, wherein said selectable items each correspond to and identify an item of merchandise from a catalogue of merchandise which item is available for shopping and for ordering to purchase by a user via operation of said hand held unit;*

a controller connected to receive and process said input signals from said sensor, said controller being arranged to respond to said commands to control said hand held unit and to said data to select a said item;

a display screen for displaying a user readable representation of said commands and displaying information relating to said item from said rewritable storage;

a telecommunications interface for telephonic transmission of information relating to a selected item or items from said storage to a remote processing center via a telecommunications network and for telephonic reception of information relating to said selectable items from said remote processing center to said storage via said telecommunications network, wherein said telecommunications interface is a telecommunications line interface integral to said hand held unit and directly connects said hand-held unit to said telecommunications network; and

a carrier for a plurality of data and/or command codes for association with means for displaying a plurality of selectable items, wherein said carrier carries a plurality of codes, each for a respective one of a plurality of natural language and/or numeric characters and a plurality of commands for controlling operation of said data entry or merchandising system, each code being associated with a visual representation of the corresponding natural language or numeric character or command and/or of a graphical representation thereof;

wherein said hand held unit is operable for a user to make shopping selections from said display screen to select and to initiate shopping orders to purchase one or more items of merchandise for a user via said remote processing center,

wherein said one or more selected items is selected individually from a list of user selectable items of a catalogue of merchandise by user input via said reading sensor sensing data and/or command codes of said carrier for a plurality of data and/or command codes,

wherein said controller is arranged to respond to data sensed by said reading sensor to select a said individual item, and wherein a shopping order is initiated via transmitting one or more shopping selections from said rewritable storage to said remote processing center.

3. A portable hand held computer, wherein said hand held computer is capable of use by a user as a data entry device and as a portable wireless telephone for voice transmission and reception, said hand held computer comprising:

memory, wherein said memory is operable for retaining information input by the user, operable for retaining downloaded information, and operable for retaining information for updating downloaded information previously retained in said memory;

a manually operable key switch for input of information;

a display interface comprising a touch sensitive screen, wherein said display interface is

operable to display user commands,

operable to display information retained by said memory, and

operable to display a list of user selectable items comprising merchandisable items, and to selectively display information relating to one or more of said items;

an antenna;

a rechargeable power supply;

a sensor operable to sense and capture data wherein said sensor is a camera;

a wireless telecommunications interface operable directly to connect said hand held computer via said antenna to a wireless telecommunications network and operable for transmission and reception of voice, data, and information, wherein said wireless telecommunications interface is operable to transmit data captured by said sensor;

an optical interface operable to establish an optical datalink for the transmission and reception of information from and to said hand held computer;

a controller coupled to said display interface, key switch, memory, rechargeable power supply, optical interface, sensor, and wireless telecommunications interface; and

a speaker and a microphone configuring said hand held computer for use as a telephone handset;

wherein said display interface, antenna, key switch, rechargeable power supply, wireless telecommunications interface, memory, controller, optical interface, sensor, speaker, and microphone comprise a self-contained assembly; and,

wherein said hand held computer is operable:

to download from a remote processing center via said antenna and at least said wireless telecommunications network **[**information relating to one or more**]** *a list of user selectable items from a catalogue of* merchandisable items*, wherein a said list of items is* for retention in said memory *and wherein each of said user selectable items corresponds to and identifies a merchandisable item which is available for shopping and ordering to purchase by a user via operation of said hand held computer*;

to transmit data relating to one or more of said merchandisable items from said memory to said remote processing center via said antenna and at least said wireless telecommunications network, and

to download information relating to one or more of said merchandisable items from said remote processing center via said antenna and at least said wireless telecommunications network in response to a said transmission of data;

to download, via said antenna and at least said wireless telecommunications network in response to entry of a user command, information from said remote processing center for retention in said memory to update information previously retained in said memory for one or more of said merchandisable items; and

as a portable wireless telephone for voice reception and transmission;

wherein further, said hand held computer is operable for a user to make shopping selections from a said list to select one or more merchandisable items, and to initiate shopping orders to purchase one or more merchandisable items for a user via said remote processing center, wherein:

(i) said one or more selected items is selected individually from a said list of user selectable items by user input via said touch sensitive screen sensing data, wherein

(ii) said data sensed is coded data of a plurality of coded data, wherein said plurality of coded data is associated with said user selectable items and wherein each coded data of said plurality of coded data corresponds to an individual item of said user selectable items,

(iii) said controller is arranged to respond to said data sensed by said touch sensitive screen to select a said individual item, and

(iv) a shopping order is initiated via transmission of data corresponding to said one or more selected items from said memory to said remote processing center.

32. A portable hand held computer, wherein said hand held computer is capable of use by a user as a data entry device and configured to be held in one hand for operable use as a portable wireless telephone for voice transmission and reception, said hand held computer comprising:

memory, wherein said memory is operable for retaining information in response to input by the user, operable for retaining downloaded information, and operable for retaining information for updating downloaded information previously retained in said memory;

a manually operable key switch for input of information;

a display interface comprising a touch sensitive screen, wherein said display interface is

operable to display user commands,

operable to display informatin retained by said memory, and

operable to display a list of user selectable items comprising merchandisable items, and to selectively display information relating to one or more of said items; an antenna;

a rechargeable power supply;

a wireless telecommunications interface operable directly to connect via said antenna to a wireless telecommunications network and operable for transmission and reception of voice, data, and information;

a controller coupled to said display interface, key switch, memory, rechargeable power supply, and wireless telecommunications interface;

a speaker and a microphone permitting said hand held computer to be used as a telephone handset;

wherein said display interface, antenna, key switch, rechargeable power supply, wireless telecommunications interface, memory, controller, speaker, and microphone comprises a self-contained assembly; and

wherein said hand held computer is operable:

to download from a remote processing center via said antenna and at least said wireless telecommunications network **[**information relating to one or more**]** *a list of user selectable items from a catalogue of* merchandisable items*, wherein a said list of items is* for retention in said memory *and wherein each of said user selectable items corresponds to and identifies a merchandisable item which is available for shopping and ordering to purchase by a user via operation of said hand held computer*;

to transmit data relating to one or more of said merchandisable items from said memory to said remote processing center via said antenna and at least said wireless telecommunications network, and

to download information relating to one or more said merchandisable items from said remote processing center in response to a said transmission of data;

to receive a request from said remote processing center to the user to input user identification information for utilization by said remote processing center; and

as a portable wireless telephone for voice reception and transmission;

wherein further, said hand held computer is operable for a user to make shopping selections from a said list to select one or more merchandisable items, and to initiate shopping orders to purchase one or more merchandisable items for a user via said remote processing center, wherein:

(i) said one or more selected items is selected individually from a said list of user selectable items by user input via said touch sensitive screen sensing data, wherein

(ii) said data sensed is coded data of a plurality of coded data, wherein said plurality of coded data is associated with said user selectable items and wherein each coded data of said plurality of coded data corresponds to an individual item of said user selectable items,

(iii) said controller is arranged to respond to said data sensed by said touch sensitive screen to select a said individual item, and

(iv) a shopping order is initiated via transmisison of data corresponding to said one or more selected items from said memory to said remote processing center.

47. A portable hand held computer, wherein said hand held computer is capable of use by a user as a data entry device and configured to be held in one hand for operable use as a portable wireless telephone for voice transmission and reception, said hand held computer comprising:

memory, wherein said memory is operable for retaining data or information in response to input by the user, operable for retaining downloaded information, and operable for retaining information for updating downloaded information previously retained in said memory;

a manually operable key switch for input of information;

a display interface, wherein said display interface is

operable to display user commands,

operable to display information retained by said memory, and

operable to display a list of user selectable items comprising merchandisable items, and to selectively display information relating to one or more of said items;

an antenna;

a rechargeable power supply;

a sensor operable for sensing user commands or data;

a wireless telecommunications interface operable directly to connect via said antenna to a wireless telecommunications network and operable for transmission and reception of voice or data, wherein said wireless telecommunications interface is operable to transmit data captured by said sensor;

a controller coupled to said display interface, key switch, memory, rechargeable power supply, sensor, and wireless telecommunications interface; and,

a speaker and a microphone permitting said hand held computer to be used as a telephone handset;

wherein said display interface, antenna, key switch, rechargeable power supply, wireless telecommunications interface, memory, controller, sensor, speaker, and microphone comprise a self-contained assembly; and

wherein said hand held computer is operable:

to download from a remote processing center via said antenna and at least said wireless telecommunications network **[**information relating to one or more**]** *a list of user selectable items from a catalogue of* merchandisable items*, wherein a said list of items is* for retention in said memory *and wherein each of said user selectable items corresponds to and identifies a merchandisable item which is available for shopping and ordering to purchase by a user via operation of said hand held computer*;

to transmit data relating to one or more of said merchandisable items from said memory to said remote processing center via said antenna and at least said wireless telecommunications network; and

to download information relating to one or more of said merchandisable items from said remote processing center via said antenna and at least said wireless telecommunications network in response to a said transmission of data;

to receive a request from said remote processing center to the user to input user identification information for utilization by said remote processing center; and

as a portable wireless telephone for voice reception and transmission*;*

wherein further, said hand held computer is operable for a user to make shopping selections from a said list to select one or more merchandisable items, and to initiate shopping orders to purchase one or more merchandisable items for a user via said remote processing center, wherein:

(i) said one or more selected items is selected individually from a said list of user selectable items by user input via said sensor sensing data, wherein

(ii) said data sensed is coded data of a plurality of coded data, wherein said plurality of coded data is associated with said user selectable items and wherein each coded data of said plurality of coded data corresponds to an individual item of said user selectable items,

(ii) said controller is arranged to respond to said data sensed by said sensor to select a said individual item, and

(iv) a shopping order is initiated via transmission of data corresponding to said one or more selected items from said memory to said remote processing center.

61. A portable hand held computer, wherein said hand held computer is capable of use by a user as a data entry device and configured to be held in one hand for operable use as a portable cellular telephone for voice transmission and reception, said hand held computer comprising:

memory, wherein said memory is operable for retaining data or information in response to input by the user, operable for retaining downloaded information, and operable for retaining information for updating downloaded information previously retained in said memory;

a manually operable key switch for input of information;

a display interface, wherein said display interface is

operable to display user commands,

operable to display information retained by said memory, and

operable to display a list of user selectable items comprising merchandisable items, and to selectively display information relating to one or more of said items;

an antenna;

a rechargeable power supply;

a sensor operable for sensing user commands or data;

a wireless telecommunications interface operable directly to connect via said antenna to a wireless telecommunications network and operable for transmission and reception of voice or data, wherein said wireless telecommunications interface is operable to transmit data captured by said sensor, and is a cellular telephone interface;

a controller coupled to said display interface, key switch, memory, rechargeable power supply, sensor, and wireless telecommunications interface; and,

a speaker and a microphone permitting said hand held computer to be used as a telephone handset;

wherein said display interface, antenna, key switch, rechargeable power supply, wireless telecommunications interface, memory, controller, sensor, speaker, and microphone comprise a self-contained assembly; and

wherein said hand held computer is operable:

to download from a remote processing center via said antenna and at least said wireless telecommunications network **[**information relating to one or more**]** *a list of user selectable items from a catalogue of* merchandisable items*, wherein a said list of items is* for retention in said memory *and wherein each of said user selectable items corresponds to and identifies a merchandisable item which is available for shopping and ordering to purchase by a user via operation of said hand held computer*;

to transmit data relating to one or more of said merchandisable items from said memory to said remote processing center via said antenna and at least said wireless telecommunications network, and to download information relating to one or more of said merchandisable items from said remote processing center via said antenna and at least said wireless telecommunications network in response to a said transmission of data;

to download, via said antenna and at least said wireless telecommunications network in response to entry of a user command, information from said remote processing center for retention in said memory to update information previously retained in said memory for one or more of said merchandisable items;

to receive a request from said remote processing center to the user to input user identification information for utilization by said remote processing center; and

as a portable cellular telephone for voice reception and transmission;

wherein further, said hand held computer is operable for a user to make shopping selections from a said list to select one or more merchandisable items, and to initiate shopping orders to purchase one or more merchandisable items for a user via said remote processing center, wherein:

(i) said one or more selected items is selected individually from a said list of user selectable items by user input via said sensor sensing data, wherein

(ii) said data sensed is coded data of a plurality of coded data, wherein said plurality of coded data is associated with said user selectable items and wherein each coded data of said pluralty of coded data corresponds to an individual item of said user selectable items,

(ii) said controller is arranged to respond to said data sensed by said sensor to select a said individual item, and

(iv) a shopping order is initiated via transmission of data corresponding to said one or more selected items from said memory to said remote processing center.

62. A portable hand held computer operable as a data entry device and a portable wireless telephone by a user, comprising:

memory, wherein said memory is operable for retaining data or information in response to input by the user, operable for retaining dowloaded data or information, and operable for retaining data or information for updating downloaded data or information previously retained in said memory;

a manually operable key switch for input of information;

a display interface, wherein said display interface is

operable to display user commands,

operable to display information retained by said memory, and

operable to display a list of user selectable items comprising merchandisable items, and to selectively display information relating to one **[cc]** *or* more of said items;

an antenna;

a rechargeable power supply;

a reading sensor operable for sensing commands and/or data;

a sensor operable to sense and capture data wherein said sensor is a camera;

a wireless telecommunications interface operable directly to connect via said antenna to a wireless telecommunications network and operable for transmission and reception of voice or data, wherein said wireless telecommunications interface is operable to transmit data captured by said sensor via said antenna;

a controller coupled to said display interface, key switch, memory, rechargeable power supply, sensor, and wireless telecommunications interface;

wherein said hand held computer is operable using said wireless telecommunications interface to download from a remote processing center **[**information relating to one or more of**]** said *user selectable* items *of said list* for retention in said memory, by utilizing at least said wireless telecommunications network, *and wherein each of said user selectable items is from a catalogue of merchandisable items and corresponds to and identifies a merchandisable item which is available for shopping and ordering to purchase by a user via operation of said hand held computer*,

said hand held computer is operable using said wireless telecommunications interface to transmit data or information relating to one or more of said *user selectable* items from said memory to said remote processing center and to download information relating to one or more of said items from said remote processing center in response to a said transmission,

said hand held computer using said wireless telecommunications interface also is operable in response to entry of a user command to download information from said remote processing center for retention in said memory to update information previously retained in said memory for one or more of said items, and

said hand held computer is operable as a portable wireless telephone;

wherein said display interface, antenna, key switch, rechargeable power supply, wireless telecommunications interface, memory, controller, and sensor comprise a self-contained assembly; and wherein said assembly includes a speaker and a microphone permitting said hand held computer to be used as a telephone handset;

wherein further, said hand held computer is operable for a user to make shopping selections from a said list to select one or more merchandisable items, and to initiate shopping orders to purchase one or more merchandisable items for a user via said remote processing center, wherein:

(i) said one or more selected items is selected individually from a said list of user selectable items by user input via said reading sensor sensing data, wherein

(ii) said data sensed is coded data of a plurality of coded data, wherein said plurality of coded data is associated with said user selectable items and wherein each coded data of said plurality of coded data corresponds to an individual item of said user selectable items,

(ii) said controller is arranged to respond to said data sensed by said reading sensor to select a said individual item, and

(iv) a shopping order is initiated via transmission of data corresponding to said one or more selected items from said memory to said remote processing center.

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