

Variable-composition communications terminal

This invention relates to a communications terminal enabling an operator to transmit or receive information, e.g. within the context of a user-friendly exchange with a processor.

In a general manner, it is known that to ensure this type of communication, keyboards are usually used comprising a set of keys most often comprised of push-buttons of the electromechanical type, grouped together in blocks in a frame that may be equipped with a means enabling a display to be provided.

A symbol or label indicating its function is, of course, attributed to each of these push-buttons. In the case of keyboards that can be re-labelled, these symbols or labels can be modified to have them suit new functions.

An embodiment of this type of keyboard, disclosed in IBM Technical Disclosure Bulletin, Vol. 27, No. 4A, September 1984, pages 2171-2, uses a touch-sensitive surface covered by a sheet of detachable covering bearing the key identification symbols of the keys of the keyboard. Means are provided to enable the computer associated with the keyboard to identify the sheet of covering used.

In certain cases, these keys can be directly associated with electronic display means controlled by the processor, which permanently indicate the functions attributed to them by a symbology that can vary with the operating mode of the unit (dynamic keys).

These terminals further comprise visualizing means enabling the display of information coming from the processor. These display means can consist in a unit that is either separate from or integrated into the keyboard.

The utilization of a transparent touch-sensitive surface with a matrix structure affixed to a visualization area has also been proposed (see IBM Technical Disclosure Bulletin, Vol. 22, No. 8B, January 5 1980, pages 3542-3). However, this solution does not enable material delimitation of the keyboard keys and the visualization area.

However, there is currently no variable-composition communications terminal comprising display 10 means integrated into the keyboard and in which it is possible to easily modify the shape, number, layout and symbology of the various pressing zones on the keyboard, and the shape, size, layout and capacity of the display zones, while having the different pressing 15 zones materially separated from one another and from said display zones.

The main object of this invention is therefore to obviate this problem.

Accordingly, there is provided a communications 20 terminal enabling an operator to transmit and/or receive information, this terminal using, coupled to a computer, a display and switching device comprising two superimposed areas, i.e. a display area capable of displaying data, e.g. symbols, images or text, by 25 energization of image elements or pixels, suitably addressed by an electronic device controlled by the computer, and an at least partially transparent touch-sensitive area having a plurality of touch-detection units managed by the computer, in such a way as to be 30 capable of being grouped together into pressing zones serving as keys.

Accordingly, this terminal is characterized in that it comprises:

- a detachable grid that can be selected from among a 35 plurality of grids having different conformations,

said grid comprising a plurality of holes serving to delimit pressing zones and one or more display zones separate from the pressing zones, each grid comprising means enabling it to be identified,

- 5 - a device for reading the identification means of said grids, this reading device transmitting an identification signal, and
- means included in the computer, for carrying out, in response to said identification signal:
- 10 - a grouping together of the touch detection units of the switching area, so as to constitute pressing zones delimited by the grid holes, as well as the management of these pressing zones,
- display of the symbology attributed to the pressing zones delimited by said holes,
- 15 - delimitation and management of the image elements of the display area situated in the display zones delimited by said grid.

An embodiment of the invention will be described hereinunder, as an unrestricting example, in reference to the corresponding accompanying drawings in which:

- Fig.1 is a schematic exploded view of a communications terminal according to the invention, associated with a computer;
- 25 - Fig.2 is a sectional view of an embodiment of the grid / switching panel / display means unit of the terminal represented in Fig.1;
- Fig.3 is a schematic view illustrating the means for validating the signals transmitted by the switching panel;
- 30 - Fig.4 is a schematic representation of an embodiment of the grid actuating device.

As represented in Fig.1, the terminal associated with the computer C comprises a frame in the form of a parallelepiped box 1 (partially represented) of which

the front side 2 comprises a rectangular window 3 of which the two opposite lateral edges 4 are fitted with sliding rails.

5 Into the two sliding rails fit, in such a way as to be capable of sliding, the two lateral edges 5, 5' of a detachable flat grid 6 in an at least partially transparent material having a plurality of holes 7 divided into two groups, namely a group of circular holes and a group of square holes. It would also be possible to use holes having different shapes. For instance, the use of triangular holes laid out in quincunx enables maximum density of holes to be attained.

10 The height of the grid 6 is provided slightly greater than the height of the window, so as to enable a slight displacement of the grid 6 without revealing the window 3.

15 The two lateral edges 5, 5' of the grid 6 have personalized notches 8 that can be detected by an identification device D connected to the computer C.

20 In this example, the switching panel 10 fulfills the role of both keyboard and display unit, non only for the display of the symbology attributed to the switching elements, but also for the display of various data.

25 This flat-shaped panel 10 of substantially the same dimensions as the window, is mounted on the inside of the box 2 so as to fit against the grid 6. This assembly is carried out by means of peripheral fasteners 11 (visible in Fig.3) associated with sensors such as strain gauges, piezoelectric pressure sensors, or any other device capable of transforming a strain normally applied to panel 10 into an electric signal, whose role will be explained hereinunder.

More precisely, the panel 10 comprises, for its display function, a matrix type network readout 10' capable of constituting an image or text through energization of image elements or pixels (schematically represented in the circle 12), suitably addressed by an electronic device 13 itself controlled by the computer C.

It can advantageously comprise a matrix type liquid crystal display device, with an active matrix, operating in the transmissive and/or reflective mode. This readout 10' could further consist in the screen of a cathode tube, or any other known readout.

According to this embodiment, the pitch of the point matrix of the readout (its resolution) is chosen sufficiently fine to enable the production of various characters and graphics while maintaining pixel size at the limit of the separating capacity of the eye, taking into account the distance between the operator's eye and the device.

A thin lighting device 14, e.g. an electroluminescent panel or even a system of fluorescent tubes intended to ensure vision of the labels being transmitted, is placed behind the readout.

A feed circuit 15, controlled by the microcomputer C, adapts the level of lighting supplied by the lighting device 14 as a function of the operator's commands on an adjustment unit 16 that may be completed by an ambient luminosity sensor 17.

As previously mentioned, the detachable grid 6 can exist in different models with holes of variable size, shape and position. This disposition implies management of the configuration of the readout in relation to the grid placed on its surface, of which the type is identified by the computer C, notches 8, identification device D assembly.

Advantageously, the profile 18 (partially represented in Fig.2) and the material (at least partially transparent) used for the grid 6 will enable the execution of an engraving 19 and a painting 19' located solely and partially on the upper side of the grid 6. In this way, it is possible to delimit the areas of the grid 6 e.g. in different colours and having an engraving 19 that it will be possible to make visible by night by means of the lighting device 14 transmitted through the readout, thanks to an energizing of the pixels 12 of a zone 20 of the panel 10 situated under the grid at the level of the engraving to be made appear, the light then being diffused in the grid 6, up to the upper engraving 19, at the required places.

The keyboard function of the panel 10 is fulfilled by a touch-sensitive surface 22 placed between the grid 6 and the readout. This touch-sensitive surface can be constructed notably using known means such as transparent contact keyboards, capacity or inductive systems or any other equivalent system. This touch-sensitive surface 22, controlled by the computer C, can be divided into a plurality of pressing zones 23 forming, as it were, keys which are each situated facing a hole 7 of the grid 6. The configuration and locations of these zones 23 are determined by the computer C on the basis of the identification signal of the grid 6 transmitted by the assembly comprised by the notches 8 and the identification device D associated with them.

When requested, validation of the command signal transmitted by a pressing zone 23 is ensured by means of the sensors 11 associated with the panel fasteners 10 (Fig.3).

These sensors 11 enable detection of a pressure voluntarily exerted by the operator on a pressing zone 23 of the touch-sensitive surface 22 to confirm his wish to act on this zone 23.

5 They are connected to the computer C via an electronic circuit 24 whose role it is to discriminate a voluntary pressure exerted on a pressing surface (characterized by an aperiodic signal of mean value other than zero) from a vibratory stress caused by the
10 environment (characterized by a mean value that is substantially nil).

 This electronic circuit 24 thus comprises a cell for filtering the signals transmitted by the sensors (circuit R-C) and a comparator 25 which compares the
15 detected and filtered signal with a threshold signal VS that may be adjustable.

 When this threshold is exceeded, this comparator 25 transmits to the computer C a signal signifying that a voluntary command action has been performed on the
20 switching panel 10. The computer C then derives a signal for validation and/or taking into account of the command, in the form of pulses applied to the grid 6.

 In fact, in the latter case, the objective is to produce a feedback to the operator in the form of a
25 physiological stimulus applied mainly to the sense of touch, already solicited by the pressure exerted on the switching panel 10, possibly to complement a visual or auditive stimulation, e.g. in the form of a modification of the appearance of the area solicited
30 and an audible beep.

 In the example represented in Fig.4, the tactile stimulus is produced by means of a mechanical translation of the grid 6 by a driving unit, in this instance an electromagnet 26 controlled by the computer
35 C. This electromagnet 26 drives a hammer 27 which

strikes an anvil 28 joined to the grid 6, thereby producing a shock of sufficient amplitude to be felt by the operator. An elastic stop system 29 serves to contain the grid and to cushion the movement communicated.

The movement pulse generated is calibrated as regards rise time, duration and amplitude so as to be perceived unequivocally by the operator.

In order to ensure best contact between the finger and the grid at the time of the pulse, a grid will favourably be made to delimit small pressing zones, at least in one dimension, or circles of diameter close to the area of contact with the finger.

The embodiment previously described enables a high density of keys to be obtained per surface unit and therefore enables smaller space requirements for a given complexity, by comparison with push-button keyboards.

**CLAIMS**

- 1 - A variable-composition communications terminal enabling an operator to transmit and/or receive information, said terminal using, coupled to a computer (C) , a display and switching device (10) comprising two superimposed areas, i.e. a display area (10') capable of displaying data, e.g. symbols, images or text, by energization of image elements or pixels, suitably addressed by an electronic device controlled by said computer, and an at least partially transparent touch-sensitive area (22) having a plurality of touch-detection units managed by said computer, in such a way as to be capable of being grouped together into pressing zones (23) serving as keys, characterized in that it further comprises:
- a detachable grid (6) that can be selected from among a plurality of grids having different conformations, said grid (6) comprising a plurality of holes (7) serving to delimit pressing zones and one or more display zones separate from said pressing zones, each grid (6) comprising means enabling it to be identified,
 - a device (D) for reading the identification means of said grids, said reading device (D) transmitting an identification signal to the computer (C), and
 - means included in said computer (C), for carrying out, in response to said identification signal:
 - a grouping together of the touch detection units of said switching area, so as to constitute pressing zones (23) delimited by the holes (7) of said grids (6), as well as the management of said pressing zones (23),
 - display of the symbology attributed to said pressing zones (23) delimited by said holes (7),



- delimitation and management of said image elements (12) of said display area (10') situated in said display zones delimited by said grid (6).

2 - The terminal as claimed in claim 1,
5 characterized in that the aforesaid visualization area (10') consists in a matrix type liquid crystal display device, with an active matrix, operating in the transmissive and/or reflective mode.

3 - The terminal as claimed in claim 2,
10 characterized in that said display device (10') is of the transmissive type, and in that a lighting means (14) such as an electroluminescent panel or fluorescent tube system is placed behind the display device.

4 - The terminal as claimed in any one of the
15 previous claims, characterized in that the aforesaid touch-sensitive area (22) consists in a flat keyboard with sensitive electronic contacts, of the capacitive or inductive type.

5 - The terminal as claimed in any one of the
20 previous claims, characterized in that the front side of said grid (6) is partially covered with an opaque layer (19') on which an engraving (19) is formed, and in that the above-mentioned computer comprises a means enabling energization of said pixels situated beneath
25 the grid structure (6) so as to enable lighting of said engraving (19), at the required places.

6 - The terminal as claimed in any one of the
previous claims, characterized in that it comprises
adjusting means (16, 17) for the level of lighting
30 provided by the aforesaid lighting means (14), said
adjusting means (16, 17) being capable of being
commanded by an ambient luminosity detector.