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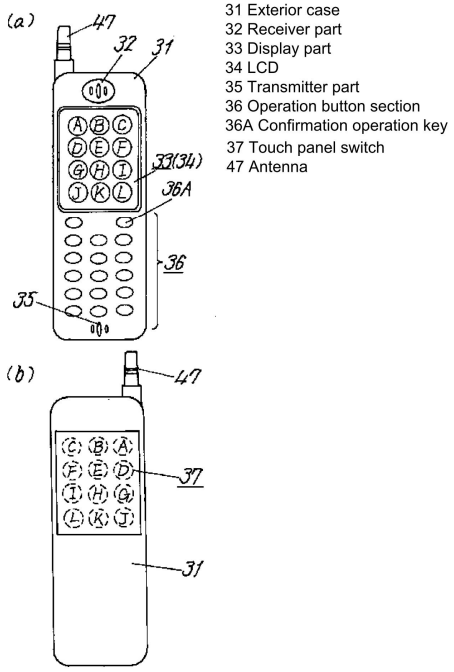
(54) **[Title of the Invention]** Electronic device

(57) **[Abstract]**

[Problem to Be Solved] [The present invention] relates to an electronic device, such as a mobile telephone or the like, comprising a display part and an input switch by which a desired selection item can be input; and an object thereof is to provide this with excellent operability, with which display part visibility is good and a desired item can be promptly selected.

[Means for Solving the Problems] Provided is an electronic device with excellent operability with which a display is not hidden by a finger while selecting, visibility of the display is good because a display face is not easily soiled, and a desired item can be promptly selected even when the number of selection items is large, because this is configured with a touch panel switch 37 disposed on the rear-face side with respect to a display part 33 on the front face of the electronic device, so as to allow selection of a desired item by way of pressing the touch panel switch 37 at a predetermined position corresponding to the desired item from among the selection items displayed on a display part 33.



31 Exterior case
32 Receiver part
33 Display part
34 LCD
35 Transmitter part
36 Operation button section
36A Confirmation operation key
37 Touch panel switch
47 Antenna

[CLAIMS]

[Claim 1] An electronic device comprising a front face display part that displays a plurality of selection items and a flat input operation part, wherein the input operation part is disposed on the rear face of the display part so as to allow operation by holding with at least one hand while viewing the display part.

[Claim 2] The electronic device recited in claim 1, wherein operating positions of the input operation part are arranged to correspond to the arrangement of the plurality of selection items displayed on the display part.

[Claim 3] The electronic device recited in claim 2, wherein protrusions are provided on the input operation part at the operating positions that correspond to the arrangement of the plurality of selection items displayed on the display part.

[Claim 4] The electronic device recited in claim 2, wherein the selection items of the display part and the operating positions of the input operation part corresponding to the same are disposed in approximately opposite positions on the front and rear of the device, with the front face display part and the rear face input operation part being substantially the same size.

[Claim 5] The electronic device recited in claim 2, wherein the selection items of the display part and the operating positions of the input operation part corresponding to the same are disposed at corresponding positions on front and rear of the device, with the rear face input operation part being larger than the front face display part.

[Claim 6] The electronic device recited in claim 2, comprising a means that can recognize that a selection item on the display part has been selected by operation of the input operation part.

[Claim 7] The electronic device recited in claim 6, which is configured so that, by way of push switches provided in each operating position of the input operation part being pressed twice within a predetermined time or being pressed for longer than a predetermined time, a selection item on the display part corresponding to that operating position is selected/confirmed.

[Claim 8] The electronic device recited in claim 6, wherein on a side face of the device held by one hand, a push switch is provided to confirm selection items selected by operation of the input operation part.

[Claim 9] The electronic device recited in claim 2, wherein the selection items on the display part are selected or moved in accordance with a vector component acquired on the basis of input variation corresponding to a plurality of operating positions that are traced when a fingertip traces in a desired direction on a flat input operation part.

[Claim 10] The electronic device recited in claim 2, wherein an upper portion containing the front face display part and rear face input operation part and a lower portion containing another function part are coupled so as to be able to be folded in half.

[Claim 11] The electronic device recited in claim 10, wherein the upper portion containing the front face display part and rear face input operation part and the lower portion containing the other function part are held in an angled position with an open angle of 150° to 170°.

[Detailed Description of the Invention]

[0001]

[Technical Field of the Invention] The present invention relates to an electronic device, primarily a mobile telephone, video camera, audio device, or the like, comprising a display part and an input switch, with which a desired selection item can be input.

[0002]

[Prior Art] A mobile telephone, as an example of a conventional type of electronic device, is described using the drawings.

[0003] FIG. 13 is a front view of a conventional mobile telephone, and in the same drawing, 1 is an exterior case, which is a housing body, and the front thereof is an operation face.

[0004] The top of the operation face comprises a receiver part 2 having a built-in speaker; and a display part 3, which is a display means, comprises an LCD 4 in a location below this.

[0005] Meanwhile, the bottom of the operation face comprises a transmitter part 5 provided with a microphone to be used during transmission; and an operation button part 6 comprising numerical keys and the like is disposed in a location above this, wherein one [button] in the operation button part 6 is a confirmation operation key 6A to confirm operations.

[0006] Moreover, as shown in a sectional view of key elements in FIG. 14, a transparent touch panel switch 7, which can be operated by being pressed with a fingertip or the like, is disposed overlaid on an LCD 4 comprised by the display part 3.

[0007] In addition, an antenna 8 is mounted on the upper end of the exterior case 1 so as to be able to extend-contract with respect to the exterior case 1 and to be stored; an electric circuit for controlling input and output information between the LCD 4, the operation button part 6, the transparent touch panel switch 7, the antenna 8, and the like is accommodated inside the exterior case 1; the configuration of the mobile telephone containing the electronic circuit is illustrated in a block diagram showing the circuit configuration in FIG. 15, which is described hereafter using the same drawings.

[0008] In FIG. 15, 9 is a CPU that performs various calculation processing, determinations, and the like; and the LCD 4, the operation button part 6, the transparent touch panel switch 7, and the antenna 8 are controlled by being directly connected, or connected via a predetermined circuit part or the like, to the CPU 9.

[0009] That is, the LCD 4 is controlled by being connected via a LCD driver 10 to the CPU 9; and the transparent touch panel switch 7 is controlled by being connected via a transparent touch panel switch driver 11 to the CPU 9.

[0010] Moreover, a signal from the operation button part 6 is processed by way of the signal being directly input to the CPU 9.

[0011] Furthermore, the antenna 8 is controlled by being connected via a transceiver circuit part 12 to the CPU 9.

[0012] Moreover, a ROM 13 in which predetermined information is registered in advance and a RAM 14 that allows information such as a telephone directory to be registered and deleted at any time are connected to the CPU 9.

[0013] Next, operation of the mobile telephone with the above configuration is described using the same drawings.

[0014] With this mobile telephone, while in a default state in which signals are not transmitted or received, a predetermined default menu 15 comprising a plurality of items and a cursor 16 indicating the item currently selected from among the items being displayed are displayed by way of the LCD 4 on the display part 3, as shown in a drawing describing

a display screen in FIG. 16.

[0015] In addition, in order to perform a predetermined operation such as making a mobile call, an operator first inputs a signal from the transparent touch panel switch 7 by pressing, with a fingertip, a predetermined portion that is displayed in order to switch the display screen from the default state to a screen with which the desired operation can be performed, moves the position of the cursor 16 displayed on the display part 3 so as to be aligned with the desired item, and then transmits to the CPU 9 a signal that indicates that the item was selected/confirmed by pressing the confirmation operation key 6A.

[0016] When the CPU 9 recognizes the confirmation signal, the display content is switched to the desired content by determining the item that was selected by the cursor 16 in the display part 3, calling a screen or the like corresponding to this from the ROM 13 or the RAM 14, and transmitting this to the LCD 4 via the LCD driver 10.

[0017] To describe the above content in further detail, when searching for and calling up a previously stored telephone number, the operator inputs a signal from the transparent touch panel switch 7 by pressing on a "call telephone number" item with a fingertip in order to switch to the display corresponding to the "call telephone number" item from among the items in the default menu 15, and then presses the confirmation operation key 6A.

[0018] By way of this operation, the CPU 9 retrieves information in a preregistered telephone directory from the RAM 14 or the ROM 13, the information is transmitted to the LCD 4 via the LCD driver 10, and the LCD 4 display switches to the telephone directory and a display that allows the same to be searched.

[0019] Next, the operator presses on the desired telephone number with a fingertip, in the same manner as above, and then selects/confirms of the desired telephone number by pressing the confirmation operation key 6A.

[0020] In this way, when the CPU 9 recognizes that the desired telephone number is confirmed, the CPU 9 sends a transmission signal via the transceiver circuit part 12 and the antenna 8 to the telephone number that was selected/confirmed above by way of performing a predetermined process.

[0021] Note that, at the same time, the CPU 9 also performs predetermined control, with respect to the receiver part 2 and the transmitter part 5, which are not shown in FIG. 15, so that an input and output signal for audio and the like can be transmitted and received via the transceiver circuit 12 and the antenna 8.

[0022]

[Problems to Be Solved by the Invention] However, with the conventional mobile telephone above, operability is inhibited and selection is made difficult by a portion of the display being hidden by a finger because the fingertip contacts the display part 3 when selecting a predetermined item displayed on the display part 3, and there is a problem of operability further deteriorating because the surface of the transparent touch panel switch 7 is readily soiled by fingerprints, sweat, and oil from the operator adhering thereon and the content displayed on the LCD 4, which is disposed underneath, being difficult to see.

[0023] The present invention solves such conventional problems, and an object thereof is to provide an electronic device with excellent operability that allows for good visibility of items displayed on a display part and for desired items to be selected promptly.

[0024]

[Means for Solving the Problems] The present invention has the following configuration in order to achieve the object described above.

[0025] The invention recited in claim 1 of the present invention is an electronic device comprising a front face display part that displays a plurality of selection items and a flat input operation part, the input operation part being disposed on the rear face of the display part so as to allow operation by holding with at least one hand, which has the [advantageous] effect of achieving an electronic device with excellent operability for which visibility of the plurality of selection items is good due to the display not being hidden by a finger of an operator during operation, and that allows a desired item to be promptly selected.

[0026] The invention recited in claim 2 of the present invention is such that, in the invention recited in claim 1, operating positions of the input operation part are arranged to correspond to the arrangement of the plurality of selection items displayed on the display part, which has the [advantageous] effect of providing an electronic device with excellent operability with which the operating positions of the selection items are easily recognized by way of the operator's finger-position sensation because the operating positions of the input operation part correspond to the arrangement of the display part.

[0027] The invention recited in claim 3 of the present invention is such that the invention recited in claim 2 is provided with protrusions on the input operation part at the operating positions that correspond to the arrangement of the plurality of selection items displayed on the display part, which has the [advantageous] effect of providing an electronic device with excellent operability with which the operating positions for pressing operations or the like of the input operation part can be easily recognized by the operator touching with a finger.

[0028] The invention recited in claim 4 of the present invention is such that, in the invention recited in claim 2, the selection items of the display part and the operating positions of the input operation part corresponding to the same are disposed in approximately opposite positions on the front and rear of the device, with the front face display part and the rear face input operation part being substantially the same size, which has the [advantageous] effect of producing an electronic device with excellent operability with which the operating positions of the operation part can be easily and precisely recognized by way of the operator viewing the positions on the display part because the operating positions corresponding to the selection items are in positions directly behind [the corresponding items] on the device.

[0029] The invention recited in claim 5 of the present invention is such that, in the invention recited in claim 2, the selection items of the display part and the operating positions of the input operation part corresponding to the same are disposed in corresponding positions on the front and rear of the device, with the rear face input operation part being larger than the front face display part, which has the [advantageous] effect of producing an electronic device that can be reliably operated by reducing operational mistakes by a fingertip of an operator, even with a small electronic device with a small display part.

[0030] The invention recited in claim 6 of the present invention is such that the invention recited in claim 2 is provided with a means that can recognize that a selection item on the display part has been selected by operation of the input operation part, which has the [advantageous] effect of producing an electronic

device that can be easily and reliably operated because the selection of a predetermined selection item can be clearly recognized by visual confirmation or the like.

[0031] The invention recited in claim 7 of the present invention is such that the invention recited in claim 6 is configured so that, by way of push switches provided in each operating position of the input operation part being pressed twice within a predetermined time or being pressed for longer than a predetermined time, a selection item on the display part corresponding to that operating position is selected/confirmed, which has the [advantageous] effect of producing an electronic device with excellent operability with which an operator can select and confirm a desired item with a single finger and at a single operating position.

[0032] The invention recited in claim 8 of the present invention is such that the invention recited in claim 6 is provided with, on the side face of the device held by one hand, a push switch to confirm a selection item selected by operation of the input operation part, which has the [advantageous] effect of producing an electronic device with excellent operability, with which confirmation can be easily and reliably performed by way of an operator, who is holding the electronic device in one hand, selecting a selection item by operating the operation part with the index finger, for example, and then moving another finger, such as the thumb, holding the electronic device.

[0033] The invention recited in claim 9 of the present invention is such that, in the invention recited in claim 2, the selection items on the display part are selected or moved in accordance with a vector component acquired on the basis of input variation corresponding to a plurality of operating positions that are traced when a finger traces in a desired direction on a flat input operation part, which has the [advantageous] effect of achieving an electronic device that can support games or the like by using movement of selection items according to the acquired vector.

[0034] The invention recited in claim 10 of the present invention is such that, in the invention recited in claim 2, an upper portion containing the front face display part and rear face input operation part and a lower portion containing another function part are coupled so as to be able to be folded in half, which has the [advantageous] effect of producing an electronic device that can be easily and reliably operated and with which visibility of the displayed items is good because the area for the display part and the input operation part can be made larger in comparison to types that cannot be folded in half.

[0035] The invention recited in claim 11 of the present invention is such that, in the invention recited in claim 10, the upper portion containing the front face display part and rear face input operation part and the lower portion containing the other function part can be held in an angled position with an open angle of 150° to 170°, which has the [advantageous] effect of providing an electronic device with which it is possible to hold the lower portion, which contains the other function part of the electronic device, in the palm of one hand, and while viewing the front face display part, comfortably operate the input operation part of the upper portion rear face with a finger of the holding hand.

[0036]

[Modes of Embodiment of the Invention] Hereafter, embodiments of the present invention are described using FIG. 1 to FIG. 12.

[0037] (Embodiment 1) Using an embodiment 1, in particular, the inventions recited in claims 1 to 8, of the present invention are described.

[0038] FIG. 1 (a) is a front view of a mobile telephone, serving as the electronic device, according to a first embodiment of the present invention; (b) is a rear view of the same; FIG. 2 is a sectional view of key elements of the same; in the same drawings, 31 is an exterior case wherein the front face is a display face; on the upper end of the display face is a receiver part 32; in the top center, a display part 33 that is a display means comprises an LCD 34; on the lower end, a transmitter part 35 is disposed; on the bottom center, an operation button part 36 comprising numerical keys and the like is disposed; and one [button] in the operation button part 36 is a confirmation operation key 36A for confirming various operations.

[0039] In addition, 37 on the rear face is a touch panel switch, which serves as the input operation part, wherein the portion of the touch panel switch 37 that allows input operations is substantially the same size as the display part 33, and these are disposed in approximately opposite positions on the front and rear faces of the mobile telephone.

[0040] As shown in an expanded sectional view of the touch panel switch in FIG. 3, the touch panel switch 37 is one wherein a flexible upper insulating substrate 40 and a rigid lower insulating substrate 41 are held with a predetermined space therebetween by a partition 44 that has a pressure-sensitive adhesive layer so that conducting films 42 and 43 formed on each of the opposing faces are not in contact, and is generally referred to as an analog type or a resistive film type.

[0041] In addition, during input operations, a predetermined output signal can be obtained by way of bringing about conduction between the conducting films 42 and 43 by pressing a predetermined position on the upper insulating substrate 40.

[0042] Note that FIG. 3 represents the dimensions in the thickness direction, in particular, as magnified in order to be more easily understood.

[0043] Furthermore, an antenna 47 is mounted on the top of the exterior case 31 so as to be able to extend-contract with respect to the exterior case 31 and to be stored; an electric circuit that controls the display part 33, the operation button part 36, the touch panel switch 37 and the antenna 47 is accommodated inside the exterior case 31; the circuit configuration for the mobile telephone according to the present invention including the electronic circuit is illustrated in the block diagram in FIG. 4 that shows a circuit configuration; and the circuit configuration is described below.

[0044] In FIG. 4, 48 is a CPU that performs various calculation processing, determinations, and the like, and the LCD 34, which is the display part 33 above, the operation button part 36, the touch panel switch 37, and the antenna 47 are controlled by being directly connected, or connected via a predetermined circuit part or the like, to the CPU 48.

[0045] That is, the LCD 34, which is the display part 33, is controlled by being connected via a LCD driver 49 to the CPU 48, and a signal from the operation button part 36 is processed by way of being directly input to the CPU 48.

[0046] In addition, the touch panel switch 37 is controlled by being connected via a touch panel switch driver 50 to the CPU 48.

[0047] Moreover, in addition to the antenna 47 also being connected to, and controlled by, the CPU 48 via a transceiver circuit part 51, a ROM 52 in which predetermined information is registered in advance and a RAM 53 that allows information such as a telephone directory to be registered and deleted at any time are connected.

[0048] Next, mobile telephone operations according to the present embodiment are described using the same drawings.

[0049] As shown in a drawing that describes the display screen in FIG. 5, in a default state in which there are no incoming or outgoing signals, with a mobile telephone according to the present embodiment, a predetermined default menu 54 comprising a plurality of items, and the cursor 55 indicating an item currently selected among the items being displayed, are displayed on the display part 33.

[0050] In addition, in order to perform a predetermined operation, such as when making a mobile call, an operator first moves the cursor 55 to the position of a desired selection item by pressing, with a fingertip, a predetermined portion of the touch panel switch 37 corresponding to substantially directly behind the position in which the desired selection item is displayed, in order to switch a display screen from the default state to a state in which the desired operation can be performed.

[0051] Then, because the touch panel switch 37 is configured with the conducting films 42 and 43 formed on the opposing faces of the upper insulating substrate 40 and the lower insulating substrate 41, which are held with a predetermined space therebetween, as shown earlier in FIG. 3, when a predetermined position on the top face of the upper insulating substrate 40 is pressed, a predetermined signal is sent to the CPU 48 as a result of contact being made between the conducting films 42 and 43 at the pressed position, and in this manner, the CPU 48 controls the cursor 55 of the display part 33 so that the desired selection item is clearly indicated.

[0052] That is, with this mobile telephone, the position of the cursor 55 is aligned with a desired item by way of pressing a predetermined position that is on the touch panel switch 37 disposed on the rear face of the display part 33 and that corresponds to the desired item from the items displayed on the display part 33; after the cursor 55 is aligned with the desired item by way of pressing on the touch panel switch 37, the operator sends a signal to the CPU 48 that the desired item has been selected/confirmed by pressing the confirmation operation key 36A; when the CPU 48 recognizes this confirmation signal, the item selected by the cursor 55 on the display part 33 is determined; the predetermined menu screen or the like corresponding to this is called from ROM 52 or RAM 53; this is transmitted to the LCD 34 via the LCD driver 49; and the display content of the display part 33 switches to the desired content.

[0053] To describe the above content in further detail, when searching for and calling up a previously stored telephone number, in order to switch to the display that corresponds to a "call telephone number" item from among the items in the predetermined default menu 54, the operator presses, with a fingertip, the touch panel switch 37 in a first row portion, in a position substantially directly behind the "call telephone number" item position displayed on the display part 33, as shown in FIG. 5, aligns the cursor 55 displayed on the display part 33 with the "call telephone number" item position, and then presses the confirmation operation key 36A.

[0054] By way of this operation, the CPU 48 retrieves information in a preregistered telephone directory from the RAM 53 or the ROM 52, the information is transmitted to the LCD 34 via the LCD driver 49, and the display on the display part 33 switches to the telephone directory.

[0055] Next, the operator presses on the touch panel switch 37 with a fingertip in the same manner as above, and then selects and confirms the desired telephone number by aligning the cursor 55 position with the desired telephone number and pressing the confirmation operation key 36A.

[0056] When the CPU 48 recognizes that the desired telephone number has been confirmed in this manner, the CPU 48 performs a predetermined process and sends a transmission signal via the transceiver circuit part 51 and the antenna 47 to the telephone number that was confirmed by the above search, and the receiver part 32 and the transmitter part 35 can be operated.

[0057] In this way, by virtue of the present embodiment, the touch panel switch 37, which is on the rear face of the display part 33, is operated by being pressed with a fingertip, and thus a mobile telephone can be realized, wherein visibility is good, as a result of the selection items or the like not being hidden while selecting with a finger, even if the number of selection items is large, and which has excellent operability, allowing the cursor 55 to be aligned with a desired item easily and promptly, and in which the reliability of the operation portion is excellent because the display face of the display part 33 is not readily soiled by fingerprints, sweat and oil from the operator and sweat and oil from around the ear of the operator does not readily adhere during a call because the touch panel switch 37 is on the side behind a receiver part.

[0058] Note that in the description above, the case of displaying with the cursor 55 as a means for identifying the item currently selected from among the items displayed on the display part 33 is described, but the characters displaying the selected item may change color or may blink, and the item content may be identified by audio expression.

[0059] Moreover, as shown in the rear view of the mobile telephone in FIG. 6, if protrusions 38 of a size that can be recognized by a fingertip are provided on the surface of the touch panel switch 37, which is disposed on the rear face of the display part 33, in the operating positions that are aligned with the item positions most commonly displayed on the display part 33, the desired item can be reliably selected because the operating position can also be easily recognized by touching with a fingertip when pressing the touch panel switch 37, and operation can be performed by way of the fingertip striking the protrusions 38.

[0060] Furthermore, in the description above, the example of a configuration having the confirmation operation key 36A as a separate button is described, but confirmation may be by determining the information that the touch panel switch 37 turned ON, and in this case, in order to differentiate

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